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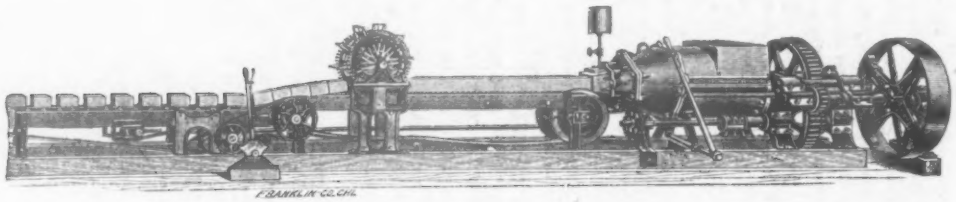

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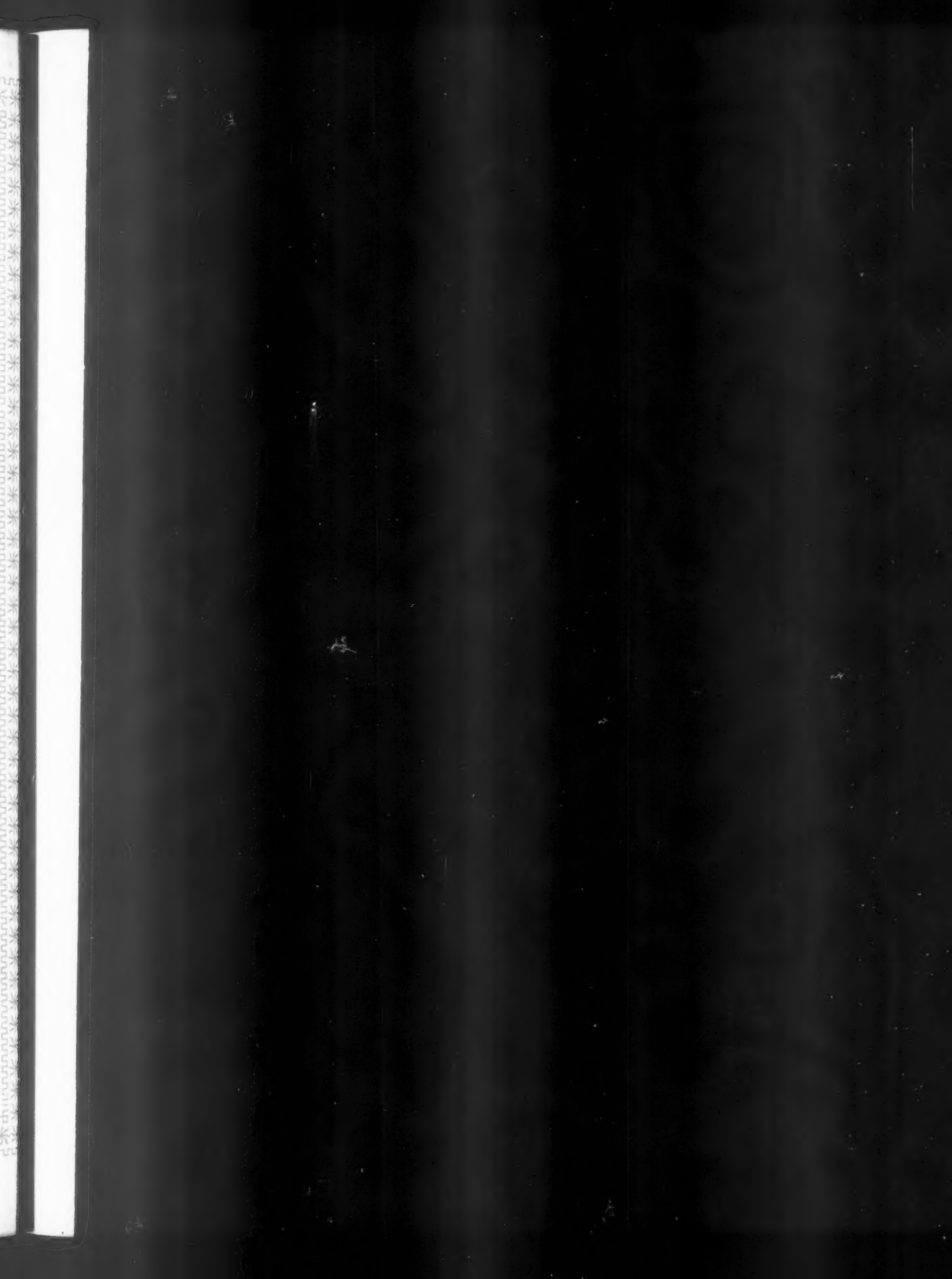


Paving and Municipal Engineering

VOLUME VIII. MAY, EIGHTEEN NINETY-FIVE. NUMBER 5.

A PLEA FOR CONTRACTORS.

ENGINEERING ethics has produced and is producing a beneficent influence among the members of our profession; and it is to the extension of those ethics in a very practicable and tangible way to the "other half" of our profession that the theme of this article has been chosen. It is, in fact, a plea for contractors from an engineering standpoint, on the following propositions:

First. Contractors are a mistrusted class.

Second. Contractors have been made such (unintentionally) by civil engineers in times past, and perpetuated by the present generation through the specifications and forms of contract which they provide, and under which contractors work.

It lies in the hands of engineers, architects and superintendents of construction to remedy the evil, by drawing up reasonable specifications and forms of contracts simpler in form, less autocratic, less dictatorial, less theoretical, less unnatural, less unreasonable.

As to our first proposition, every engineer knows, in fact, the public at large knows, that a contractor will not do anything that he is not made to do; that he takes no special pride in his work; that he does nothing unforeseen or unspecified without extra charge; that the construction is carried on largely as a warfare; that in the preparation of specifications for any work the engineer lies awake at night wondering if he has left "anything out," and every day he is in dread of having his assistants or inspectors report at the office a case of failure to comply with specifications as regards material or workmanship, and placing him under the painful necessity of becoming judge, jury and executioner in dealing with the refractory contractor. Every engineer knows the great effort he

makes to secure good bonds and to make a contractor thoroughly responsible. He knows that there is a sigh of relief when the work is done, although it is only approximately as well done as his specifications called for; in short, every one knows, including the contractor himself, that it is believed he will beat you if he can.

We hasten to our second and larger proposition, because we think in this arraignment of engineering specifications we have the origin of the whole trouble, and that we have but to correct our specifications to correct our contractor; not in any sense to lower standards of good workmanship, but to give credit to the contractor that he is a man, not a machine; that he has pride, honor, reputation and fortune at stake in his every undertaking.

Specifications, as now drawn up, are an attempt to perform in detail on paper all the operations necessary to complete the given structure, and they thus become so elaborate and wordy as to practically defeat their object in the very beginning. Specifications are prepared in the light of perfection, and are generally more faulty than the structure itself, and generally so full of provisos, arbitrary powers delegated to one party and unnatural responsibilities laid on the other party, so full of bonds, acknowledgments, etc., that the contractor, thus given the suspicion and bad name in the start, generally deserves it to the end. Specifications are seldom read by the contractor until after he commences work on the contract. This shows how little attention he pays to what has been carefully prepared.

Let us look at the form of specifications that are now generally considered standard in municipalities, companies, and first-class engineering offices. The first thing that strikes the eye of a contractor in looking at the specifications, is some glaring headline in red ink, telling him that "prices must be written in words as well as in figures," implying that he does not know how to write, and that his 2's may look like 4's, and his 3's may look like 8's. Or it may be that "Contractors are requested to notice any changes and insertions that may have been made in the specifications before depositing their bids," thus telling him plainly that the engineer has changed his mind or made some mistake. Or it may be in a redder red ink that "bidders must accompany bids with a bond of so much," etc., giving him to understand that his business career of

a lifetime, his well-known work, his individual character, are as nothing compared to two men who are willing to sign their names for so much money. Then he turns the page after some statements as to when the bids will be received, and finds "Bonds A" and "Bonds B," with several blank notary acknowledgments as to his bondsmen being resident freeholders, and that he is held to commence the work, and that his bid *can not be withdrawn*, although the "right to reject any or all bids" is reserved by the other party. Then comes an approximate estimate of quantities, followed by a "form of proposal," and all *before* he has reached the specifications, which should precede the form of proposal, in order to enable him to know *how* to propose. Then come the specifications (of which we will speak later), followed by the contract or articles of agreement, which generally are a repetition of the form of proposal and the specifications, and then concludes with more bonds, more notary acknowledgments, etc. The only bonds required should be these final bonds for the contract, and not for the mere formality of a form of proposal. Indeed, in the writer's opinion, looking at the subject in all its bearings and the failure to collect or to enforce bonds in nine out of ten cases, the best bond would be "*no money for work*" except according to specifications, and if not in accord thereto, the contractor to leave the material and workmanship in the work as a forfeit for his incompetency and unfaithfulness. It would have to be wretched work and material indeed that would not compensate for the failure to complete.

Passing from this general style and form of specifications, let us examine some of the defective clauses and stereotyped phrases which make a set of carefully prepared specifications inoperative and non-effective. "The right to alter and to increase or decrease quantities" is an acknowledgment of insufficent care in estimating the work; that there is not a full understanding on the part of the engineer of what he is proposing to do and how to do it. It puts a contractor to the disadvantage of doubt in contracting for his material in large quantities and the cost of delivering and rehauling quantities not wanted. It is a weakness—a specification that does not specify.

"Under the direction of and to the satisfaction of the engineer." This is a clause that, in the hands of an honorable man and com-

petent engineer, would be of itself the most perfect specification that could ever be drawn. Nothing more would be needed. It is a great power—a great responsibility. Too often its power terrorizes a contractor and he becomes a toady, and seeks to corrupt by present, bribe or commission. This right should not be waived, but its exercise should be based on full and complete knowledge, and tempered with considerations of time, place and conditions, and, above all, should be human.

"The contractor will be held responsible for all damages." This seems to be extreme and unjust, for it is the contractor that is dealing with the unknown; with the total depravity of things inanimate; with the perversities of men, women and children; with the unlooked-for action of the elements, the trouble of the labor market, the defects and dangers of work designed by others. All these and other tribulations are far beyond his control.

"No extra work will be paid for unless ordered in writing.' This is a provision seldom carried out. Extra work generally arises from emergencies, and the engineer as a rule, in meeting the emergency, gives his orders on the ground verbally, in nine cases out of ten thus annulling his own specifications, and if it were strictly carried out, would be asking extra work without compensation to the contractor, simply on the ground that the orders are not in writing.

"Incompetent workmen must be dismissed at the request of the engineer or inspector." Here is a thrust at the management of one's business which no high-spirited man would tolerate; least of all when he is under bond to complete the work in a satisfactory manner. Therefore, why should the matter of workmen be dictated by any other than his employer?

The city of Cincinnati recently, upon the report of the corporation counsel, adopted the following clause to go in all specifications hereafter: "No person shall be employed by the party of the second part as a laborer or artisan in the execution, in this city, of any part of the work herein provided for, who shall not have been a bona fide resident of the city of Cincinnati for at least six months prior to the date of his employment. In case the contractor knowingly violates this requirement of the specifications, or if, after notice that any such non-resident is employed, he continues to

employ him, the city will retain out of the moneys due the contractor on his said contracts, the sum of $2.00 per day for each of such persons, being deemed and held to be liquidated damages for violation of this clause."

This might, with equal propriety, be carried a step further, and no contract be let to any other than a Cincinnati contractor. Of course, it is a proposition to meet the problem of the unemployed at the present time, or it may be a political bid for future effect, but such a right reserved would doubtless prove unconstitutional if appealed to the courts; and if not so decided, it certainly is a restricting of the business management of one's affairs, which few men, if any, would allow to be imposed on them.

"Letting to lowest bidder" is wrong. It is a premium set on poor workmanship and material at the outset. The price of the lowest bidder has all the profit taken out of it by the judgment of a dozen of higher bidders just as anxious to get the work.

"The right to reject any or all bids" is an injustice. It has the ring of insincerity about it—as if the proprietors were not sure of having the work done. When work has been planned, specified and advertised, it ought to mean that it is going to be let, and that to the lowest responsible bidder. Bidding costs money and time to the bidder.

In between such headings as these are many petty details (witness the length at which defective material is generally dwelt upon); how and when to use tools; weight of hand-rammers; number of men to ditch; that the work must be carried on at such time and place as the engineer may direct; how to mix mortar or concrete, and numerous other directions which imply that the contractor must learn how to do his work from the specifications, as though they were a text-book.

The engineer stands between the corporation or owner on the one hand, and the contractor on the other; and it is to the engineer that we must look for a correction of these errors in practice, and the removal of the evil name of the average contractor. The contractor should be regarded as a man with a man's life's interest at stake; that he has a home; that a wife and children love him and respect him, and for whom he toils. The worker is above the work. "Life is more than meat, and the body more than raiment."

The contractor at best has the poor end of the bargain. He is the one that often advances large sums of money in the undertaking. He is the one that deals with the difficulties and takes the chances more than any one else. A contractor and engineer must have mutual regard and esteem for each other; must consider themselves co-workers, "useless each without the other;" that the structure they build is the joint product of their brain and hand, and that the failure or success is equal to each. Contracting should be raised to a higher plane of business. Contracting, more and more, should pass into the hands of construction companies, which should be organized with adequate capital, sufficient machinery and experienced workmen, and whose very bid for work would be a guarantee of its excellence. Bidders should be invited and not advertised for. Every engineer knows that he dreads the appearance at his office of inexperienced and unworthy contractors to look over his plans and proposed work, in answer to the newspaper advertisement, and feels himself helpless to prevent the tender of a proposal, which generally turns out to be the lowest, and consequently entitled to the work.

Work should be let to the lowest responsible bidder, not to the "lowest" necessarily. Specifications should specify the class of work, rather than the detail of doing it; should give quantities in the proposed work, time of completion, manner of payment, and have a simple form of contract. Monthly payment on account should be arranged for, of a certain proportion of the finished work. This is no more than right, and would relieve a contractor often of an unnecessary financial strain. Engineers should let work more on specially prepared plans than attempt to use such elaborate and wordy specifications.

Engineers should give contractors advice as to the best time, place and methods of doing the work, as if they had the interest of a partner in the success of the work.

It is not expected that all can be reformed in a moment, nor by a single engineer alone. In fact, it would be hazardous for an engineer to trust in contractors, as he now finds them, before they have become deserving of confidence, but gradually, little by little, the foregoing suggestions, if considered wise and judicious, might be put into operation, and gradually a higher class of contractors

secured to the construction of private and public work. If the old ways are the best, are the result of combined wisdom, are true and tried, and have not been found wanting, then this "attack" upon them will but strengthen their merit. *Charles A. Ewing, C. E.*

THE PUBLIC LEVEE AT WINONA, MINN.

LIKE many of the towns on the Mississippi river, Winona had originally an extensive public levee which was the property of the city corporation. At the time steamboating was in its prime on the Upper Mississippi the levee at Winona was a busy place, and was fully double the size of the present corporation holding.

Time has changed the entire uses and importance of the river front. Encroached upon by railways without grants, and reduced in size by grants from city councils who little knew its real or future value, the levee has been reduced to its present limited area, extending from a point forty-five feet west of the westerly well of the city water-works to Walnut street.

Without attention, uneven and sandy as this river bank was, nevertheless large numbers of the citizens continued to flock there during summer evenings to enjoy the view and boating. To such an extent did this popular resort become frequented that a few years ago there came an almost general demand for some improvement. Several unsuccessful attempts made about that time to obtain grants of portions of the property resulted in hastening action on the part of the city government.

When first considered there was an almost unanimous opinion that simply to pave the bank, as is commonly done, with stone would not prove exactly satisfactory. What was wanted was a levee which would be more of a park, and yet be available for steamboat purposes.

Many plans were made and at last the plan suggested by W. A. Finkeluburg, the city attorney, was partially adopted, and with such changes as were necessary in finally designing and constructing the work, is practically the design shown in the accompanying plans.

In the winter of 1892–3 the city awarded a contract for 3¾

miles of brick paving, and in discussing the place of deposit for the excavated materials the levee improvement came prominently up for consideration. To protect this filling, which it was decided to dump there, a contract was let for the early construction of the outer or river wall.

This wall is built of native limestone with quarry face, laid up in natural cement mortar and pointed with Portland cement. The foundation is of small piling that would square up six inches and are ten to twelve feet in the ground. The grillage is of three-inch plank spiked to pile heads and laid diagonally.

The coping is in one piece, eighteen inches in thickness and twenty-six inches wide at the base, bush hammer dressed to a fairly even surface and true lines. None but large stone were allowed in the wall, and the majority were handled with a derrick.

Cut stone steps, twenty-five feet in length, as shown, were constructed opposite the center of each street to enable small boats to make a landing at medium stages of the water, which usually stands at two feet above low water.

In the winter of 1893-4, the sand filling between the river wall and the second wall was put in by the city by day's work, in order to afford work for the needy unemployed.

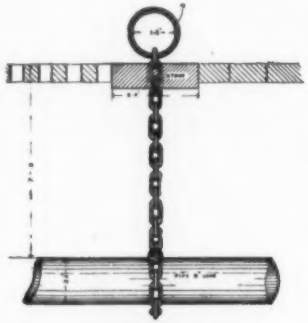
The outer thirty feet of pavement is laid on a grade of 15 per cent., so that boats may readily land against the pavement without touching the outer wall. The southerly thirty feet of pavement is laid at a 5 per cent. grade, and is intended for driving east and west along the river front.

The stage of water most inconvenient to make a landing in, is when the water just reaches the foot of the second wall. At this time a boat needs a gang-way of twenty feet in length. It is seldom, however, that the water reaches this stage, and then only remains there for a few days, so that this disadvantage is not as great as it seems.

The paving is of limestone blocks, laid in the sand and gravel, which had been settled by the spring high water, and having the interstices filled with sand. The pavement was laid, tamped and rolled with a seven-ton roller. Care was taken to have the work as even as this class of work can be. The blocks were laid to even

PUBLIC LEVEE

WINONA, MINN.



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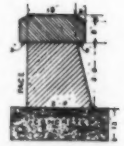

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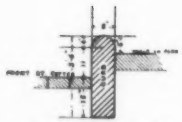

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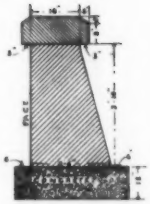

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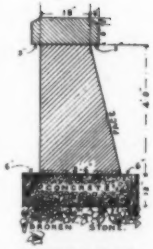

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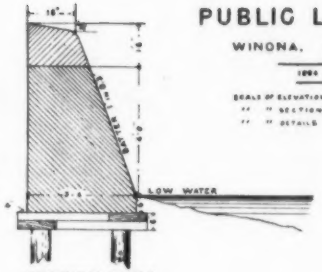

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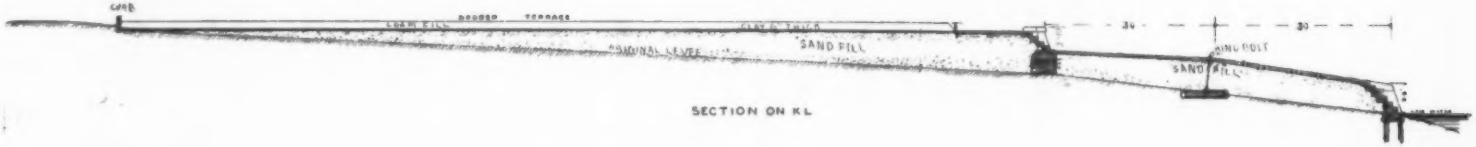

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courses and varied in size from 2½ x 6 x 8 in., to 9 x 12 x 12 in. The edges and top were hammered to fairly even lines and surface.

At the line of the break in grade of the pavement, anchor bolts, as shown in the details on sheet No. 2, were put in every one hundred feet for convenience of steamboats.

In order to obtain a solid foundation for the second wall, the filling was excavated to the original levee line, and two and one-half feet of finely broken stone were laid of the same width of the concrete footing. The broken stone was tamped thoroughly and grouted full with a mortar made of one part American natural cement and three parts clean, sharp sand.

The footing course of concrete was made of one part natural cement, two parts clean, sharp sand, and four parts broken stone. The stone was broken so as to all pass through a two-inch ring. The concrete was thoroughly rammed and tamped and allowed to set firmly before stone work was laid.

The second wall and the walls on Center street are of quarry-faced ashlar masonry laid in cement mortar and pointed with a mortar of Portland cement. Native limestone was used. The top of this wall is at an elevation of 14.85 feet above low-water mark, and is at the elevation of the highest water known here, with one exception.

Steps, as shown in the plan, were put in so that pedestrians can easily go from the park proper to the levee. Around the wall these steps are circular. The circular steps will be fifty feet in length. The straight steps are ten feet in length.

The sand filling back of the second wall is being put in by the city by day's labor. After this filling is completed, a course of clay six inches in thickness will be laid over the sand to hold the moisture for grass and flowers in the loam above.

The entire park will be laid off with walks, sodded, ten and eighteen inches in the front, arranged with trees, fountains and seats.

Along the south line of the park, next to Front street, a curbing will be set as a protection from the street traffic.

The main walk, fourteen feet in width, along the second wall, will be of stone flagging, as also will be the walks on each side of Center street. Center street is to be paved with brick from the end

of the present pavement, near Second street, to the stone pavement of the levee. The other walks will probably be of gravel.

The future completion of the work will extend the outer wall westerly and arrange for a driveway around the water-works into Front street, just west of the west well; also an extension easterly to Walnut street. The easterly extension can not, however, be made until a lease held by "The Diamond Jo" Steamboat Company expires, in 1897.

Materials and labor are as follows here: Stone in the rough is delivered for $5 per cord; American cement costs 65 cents per barrel; Portland cement, $3.50 per barrel; common labor, from $1.25 to $1.50 per day; mechanics receive from $2.50 to $3. The sand handled by the city was delivered for 19 cents per cubic yard. The clay and loam can be delivered for 75 cents per cubic yard. The flagging will cost 15 cents per square foot.

So far, the work has cost the city, including the fill put in this winter, as follows:

Outer wall, complete	$5,307 00
Inner wall and paving	10,602 67
Sand filling by the city	4,000 00
Total	$19,909 67
Add for completion of the work (estimated)	9,000 00
Total cost of improvement	$28,909 67

Fred H. Pickles.

FRED H. PICKLES was born at Nova Scotia, Canada, in 1865. He graduated at the University of Mt. Allison, New Brunswick, in 1888. Mr. Pickles, although a young man, has had much practical experience in his profession. Before coming to the United States he was assistant engineer on the Short Line Railroad in New Brunswick. For two years he was assistant city engineer of St. John, New Brunswick. In 1890-91 he was resident engineer of the bridge crossing the Mississippi river at Lyons, Iowa. He was for two years in the employ of C. F. Loweth, at St. Paul, a member of the American Society of Civil Engineers. Mr. Pickles came to Winona in May, 1892, and after his arrival was elected to the office of city engineer. His first work of any note in Winona was in assisting in the completion of the high bridge across the Mississippi river, and the pumping plant in Winona. Since Mr. Pickles has been city engineer of Winona there has been about $60,000 worth of sewerage constructed there, besides having charge of the laying of Winona's brick pavements. Mr. Pickles also designed the electric light plant at Rochester, Minn.; water-works for Galesville, Wis.; Independence, Wis.; St. Charles, and Rolling Stone, Minn., and improvements of water-works in Winona.

SYSTEM OF RECORDS IN A CITY ENGINEER'S OFFICE.

[A description of the system in the office of the city engineer at Burlington, Ia.]

THE keeping of complete records in a systematic and comprehensive form in the municipal engineer's office is fully of as much importance as any of the numerous other duties devolving upon this officer, which will be admitted by any one experienced in this branch of the engineering profession.

As a general rule the work of the municipal engineer in the smaller cities and towns includes the surveying of lots or tracts of land owned by private individuals and this particular branch of the business proves sometimes very trying and disagreeable for want of any reliable records pertaining to original or former surveys, which is nearly always the case where an engineer or surveyor is employed by the day and paid only for the time actually employed in the field, but receives nothing for recording his notes for future reference, and consequently no public record is kept which would aid his successor in office to retrace old surveys accurately, thereby saving the reputation of the surveying profession and not infrequently prevent costly litigation.

The writer, when assuming the duties of city engineer in 1882, at Burlington, Iowa, found hardly any records of value left by his predecessors, but being employed by the year at a fixed salary, he was enabled to devise and inaugurate a system of keeping the records in his office which has proved very satisfactory. The first step taken was the getting of a well-bound blank book, containing one hundred pages, of twenty by twenty-seven inches in size.

In this book the entire city additions and subdivisions are platted to date, to a scale of one hundred feet to the inch, which gives ample space to mark in plain figures the dimensions of the smallest lot. The copies are made from the original records and carefully checked. All original dimensions are marked in black, and the actual ones, as ascertained by careful and repeated measurements, in blue, showing at a glance the difference between the recorded and actual dimensions. The angles at street intersections or other points where they occur, are recorded in their proper places, as are also the monuments and other reference points.

For field use, blank books five by eight inches in size, containing 180 pages each, are employed, platting a block on one page, and reserving the other page for recording notes, with reference to date of surveys, etc. The dimensions are marked in black and blue, the same as in the large plat book, and the angles recorded in their proper places. The blocks are platted consecutively, so that surveys of a number of blocks can be made without carrying more than one book at a time. These field books are much more convenient than a map or plat; besides, the field notes can be recorded more accurately and in a more comprehensive form, which is very essential for making future surface correctly and without loss of time.

In the large plat book, also, all established grades are recorded in the block corners, defining the grade along the building line, forming a complete and convenient record of grades in addition to the ordinance book, which is in the custody of the city clerk.

Beginning with the cross-sectioning of streets for computing earthwork quantities, the field-books used are pocket size, five by eight inches, with the left-hand page divided into ten columns and the notes kept as follows: In the first column, under the head of "Stations," all stations and distances out from the center to each side of the street are recorded. Rod readings are taken at the center, line of curb, and property line and all intermediate points, where the ground changes perceptibly. In the second column, under the head of "Observation," all rod readings are recorded, with the sign of + or — for back and foresights, to distinguish them from the readings at stations and distances out. In the third column, under the head of "Elevations," all elevations, including heights of instrument and bench marks, are recorded, the heights of instrument being underlined to distinguish them from other elevations. In the fourth column, under the head of "Grade," the grade elevations for stations and distances out are noted. In the fifth and sixth columns, the difference between ground and grade elevations are marked and called "cut" or "fill," as the case may be. In the seventh column, the end areas in square feet divided by 54 are recorded and called half end areas. In the eighth column, under the head of "Total Areas," the two half end areas of each section between stations are added together, which are then multiplied by the distance in

feet between stations, giving the amount in cubic yards, which are recorded in the ninth and tenth columns as "Excavation" or "Embankment." The right-hand page is used for plan of improvement, showing position of curb, pavement, sidewalk, etc., or, if preferred, for cross-sections, as the same is divided into squares with sides equal to one-tenth of an inch, or one hundred squares to the square inch, making a very convenient scale for cross-sectioning purposes.

These books are also used for field notes on location and construction of sewers, culverts, or other improvements of like nature, requiring ordinarily the first five columns only, and of the left hand page for recording notes, ending with the cuts marked in the fifth column, unless it is required to calculate the contents of the trenches, which may be done in the same manner as noted heretofore. On the right-hand page a longitudinal plan of the sewer or other structure is drawn, showing its exact location in the street or alley within one block, which gives a scale large enough to mark all necessary details in plain figures, and while it requires the drawing of the plan in sections, in case of an extensive sewer, it is still more convenient than the carrying around of a plan, which is liable to become soiled or torn.

All field notes, after being carefully checked, are inked in, the dates when work is done noted at the top of each page, and when a book becomes filled up it is filed away, being numbered and its contents indexed for ready reference, making a very complete record of details which will be found very valuable in case a dispute between the city and the contractor should arise as to the amount of earthwork, etc., which will sometimes happen, especially when the field notes have been kept in a shiftless manner, and probably destroyed, after the final estimate has been rendered, not deeming them of any particular value, giving the dishonest contractor a chance to take advantage of the engineer's carelessness, and weakening the confidence of the honest contractor in the correctness of the engineer's estimates.

In addition to this record of details a general record of all improvements is kept under the following headings:

1. Grading.
2. Curbing and Paving.
3. Stone Culverts and Retaining Walls.

4. Tile Drains for Surface Drainage.

5. Sewers, giving in a condensed form (each item being placed in its proper column), location and extent of improvements, number of cubic yards of earthwork or stone-masonry; length, width, kind of material, and number of square yards of pavement, number of feet of curbing, kind of material, size and length of sewers, and surface drains, cost per yard or foot, total cost, amount paid by city, amount assessed against abutting property, date of completion of each improvement and name of the contractor.

At the end of each year, the totals are footed up, and these again added to those of preceding years give the grand totals to date.

Besides these records all plans of sewers, street improvements, etc., are copied in a large blank book, together with all the necessary data, and properly indexed, which I find preferable to the filing away of loose sheets in drawers, or rolls in pigeon holes, which often get misplaced, and cause many a tedious search, besides becoming more or less soiled and torn.

For the records of sewer connections, a book is employed in which the left hand page is divided into columns, headed as follows: Number of junction, diameter of junction, elevation of invert, grade of street or alley, difference between elevation of invert and street or alley grade, distance of junction from man-hole or other fixed point, house number to be connected, name of street, name of applicant, name of plumber making the connection, date when connection is made. On the right hand page a plan of the sewer is drawn, showing its exact location in the street, with man-holes and junctions marked in their proper places, and the distances between them, as also the lots on each side of the street or alley, and when a connection has been made, it is drawn on the plan, from the junction with the sewer to the building line, showing at a glance what buildings have connection with the sewer.

Under a city ordinance of Burlington, in conformity with the laws of the State of Iowa, it is made the duty of the city engineer to prepare a list of the properties liable to special assessment for each public improvement, together with the names of owners and the amount assessable against each per front foot for street improvements and per square foot for sewer construction. This work needs to be

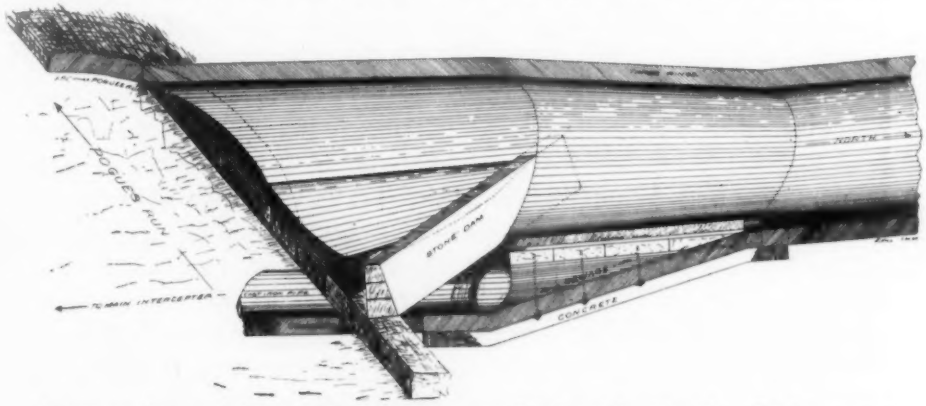
done with the utmost care, so that each piece of property bears its just proportion of the improvement, and as the interested property owner is very apt to call on the engineer for information and explanation concerning the amount of his assessment, it becomes necessary for that officer to keep a complete record of all special assessments. For this purpose I use a specially prepared blank book with properly headed columns on the left hand page, giving name of owner, number of lot and block, where located, either in original city, addition or subdivision, number of front feet or square feet, cost per front or square foot, and total cost. On the right hand page a plat of the abutting property is drawn, with the number and dimensions of each lot, as also the number of square feet in case of sewer construction, plainly marked, which furnishes a very accurate check for the notes on the left hand page, making erroneous assessments next to impossible. *William Steyh, C. E.*

WILLIAM STEYH was born September 17, 1845, at Kesselbach, Province Oberhessen, Hessen-Darmstadt, Germany. He attended the public schools from 1851 to 1859, graduating therefrom at the age of fourteen, and, finding employment shortly thereafter with a surveyor, assisted in land surveying and highway construction for the following six years, pursuing studies in geometry, trigonometry, etc., during the winter months, aided by a tutor. From 1865 to 1866, Mr. Steyh assisted in railroad surveys, which work was suspended indefinitely on the declaration of war between Prussia and Austria, and as the prospects of employment in the various branches of surveying and engineering continued rather gloomy, even after peace had been restored, he concluded to bid farewell to the fatherland and go to the land of the free. After landing in New York, in June, 1867, and paying a visit to relatives in Wheeling, West Virginia, he continued the westward journey as far as Burlington, Iowa, where, in the spring of 1868, he found employment on the Burlington and Missouri River Railroad in the western part of Iowa and the eastern part of Nebraska. He remained in the employ of this company till the early part of 1870, resigning the position of assistant division engineer on construction to engage in mercantile business at Burlington, Iowa. After a year and a half he returned to engineeering, taking charge of the construction of a small water-works plant at the Iowa Hospital for the Insane, at Mt. Pleasant, Iowa, including the laying out of a portion of the grounds belonging to this institution, which work was completed in the latter part of 1872. From 1873 to 1878, he surveyed, and had charge of the construction of, four street railway lines, and engaged in a general practice of surveying and engineering at Burlington, Iowa. From 1878 to 1882, he followed railroad engineering in the employ of the Chicago, Burlington and Quincy, the Burlington and Missouri River, and the Burlington and Western Railroad, respectively. From 1882 to 1892, with the exception of 1884, he has been city engineer of Burlington, Iowa.

SOME SPECIAL SEWER CONSTRUCTION.

DURING 1894 there was constructed in the city of Indianapolis twenty miles of sewers in accordance with a general plan formulated by Mr. Rudolph Hering, sanitary engineer of New York City, and now being carried out by Mr. C. C. Brown, city engineer, (and his assistants) who was appointed to the office after Mr. Hering's plans had been adopted by the board of public works.

I do not at this time wish to go into details of the general plan as laid out, though not yet perfected, but more particularly to explain the details of a portion of it, and which I will designate as Section No. 1 of the Mississippi street sewer, which is 1,914 feet long, and begins at Pogue's Run on Merrill street and ends at the



intersection of Kentucky avenue and Georgia street. This sewer was constructed in the center of the street, circular in form, composed of three rings of brick, according to the general specification in force. The internal diameter is 8 ft. 6 in., excepting at Pogue's Run and Kentucky avenue.

The first ten feet at Pogue's Run has for the upper part a radius of 5 feet, making it circular in form, which is carried below the springing line, until it meets the invert, which has a radius of 21 ft. 7 in., making the two diameters 10 ft. and 7 ft. 4 in., respectively. The end or mouth of this section is groined into one of the arches that carries the roadway of Merrill street over Pogue's Run, and which strikes the center line of the sewer obliquely, having the angle of divergence on the west side about 120°. Under-

neath this section is a cast iron pipe 2 ft. 6 in. in diameter, and 12 ft. long, which is connected with another section of the same sized pipe, that is buried under the bed of Pogue's Run, and enters into what is known as the "Main Intercepter." The main intercepter runs south in a general line with Pogue's Run to White River, a distance of two miles below the present mouth of the Kentucky avenue sewer, and carries off at present nearly all the sewage matter from the city. This pipe is laid on a bed of concrete 12 inches in thickness and 3 feet wide. The mouth of, or north end of, the pipe is securely held in place by a brick wall 4 ft. 6 in. thick and 5 ft. long, built entirely around it. The remainder of the pipe is covered with earth well rammed and tamped even with the upper surface of the pipe. There is then laid a layer of concrete even with the top of the brick work, which is carried about 4 inches above the pipe, from which is started a stone dam 3 ft. 2 in. high above the water line of the sewer. The intervening space between the top of the pipe and bottom of invert of the end section is filled with earth well tamped in and covered with concrete 12 inches thick, in which is formed the invert, making a strong and solid foundation for the sewer. The dam is made of four courses, 12 inches thick, of very hard limestone, dressed, with a batter on the face of 3 inches per foot of height, and built solidly into the sides of a section of the sewer, which is 3 feet long and 10 feet in diameter. The next section of sewer changes in form, being reduced from 10 feet to 8 ft. 6 in. in diameter, and is 15 feet long; in the bottom of this section is a sluice of same length and 2 ft. 6 in. wide, having a gradient of 2 ft. 6 in. in 15 feet, beginning at O at a distance of 15 feet from the mouth of the iron pipe, and gradually sloping until it strikes the bottom of the pipe. The bottom of the sluice is circular in form, and conforms to the shape of the pipe. The side walls are carried up straight, in which are imbedded steel dowel rods 1 inch in diameter, and which are inserted in the bottom of the coping, also of hard limestone, and 1 foot in thickness, beveled on the top side towards the sluice, so that no sediment can lodge in its surface. The object of the dowel pins is to keep the stone coping in place and overcome the pressure of the sewer against it, as the bottom of the sewer is started from the back edge of the coping.

The total distance from the bottom of the iron pipe to the top of

the stone dam is 6 ft. 4 in., and the whole of the sewer for a distance of 28 feet from the mouth has a concrete foundation which is carried up perpendicularly with the sides of the ditch, 2 feet in thickness, to a height of 1 ft. 9 in. above the springing line, there being a line of oak sheeting between the banks and the concrete.

On the top of the concrete are formed spandrels which gradually taper to the crown of the arch, making the sewer very strong.

The object of this section of the sewer is to form an overflow into Pogue's Run, when the sewer is taxed to its full capacity by reason of floods and excessive storm water. The whole of the sewage passes through the iron pipe until the water rises above the top of the dam. Then it overflows and passes away along Pogue's Run to the river. The heavy sewage matter will float at the bottom of the sewer and pass through the pipe, while the storm water, which is comparatively pure, will pass over the dam and quickly flow away. During storms the sewage is sufficiently diluted by rain water so that the portion which overflows into Pogue's Run with the storm water can produce no nuisance. *E. Hill, C. E.*

THE NEW DEPARTMENT OF PUBLIC WORKS IN SAN FRANCISCO.

THE tendency to concentrate responsibility in the heads of the several municipal departments, which is so strongly manifest in all parts of our country, and which has led the charter makers of San Francisco to concentrate great power in the hands of the mayor, should have led to the creation of a board of public works, with a president, exercising supervision over the necessary sub-departments—such as street and drainage work, street cleaning, construction of public buildings and surveys, and these sub-departments should in turn have had responsible heads.

Mr. Robert Moore, in speaking of the Board of Public Improvements, as established by the charter of 1876, for St. Louis, says: "The central ideas of this plan of managing public works are, briefly: 1. The subdivision of the engineering work of the municipality into several departments, under the executive control of one man, who should be a man of strong character and mature

judgment, and an expert in the special work under his charge. 2. The creation of a municipal engineering council or board of experts, composed of the heads of the several engineering departments, co-ordinated under the presidency of an engineer of high rank, to which board all questions concerning the administration of the city works may be referred, and to whose special charge should be committed the letting of all contracts for public work, and the initiation of all legislation relating to the same."

From these ideas, which have been applied with signal success in St. Louis, the charter as now proposed for San Francisco departs considerably. It is here provided that all public works, including public buildings, but not including parks, shall be constructed and maintained by a board of public works, consisting of three commissioners, who shall not engage in any other business. They are to be appointed by the mayor for terms of four years, except that those first appointed will hold office for two, three and four years respectively. The president of the board is to be appointed by the mayor for a term of one year, and it is prescribed that specific duties are to be apportioned to each member to be performed during the interval between meetings. This requirement may possibly lead to such apportionment of duties depending upon the special qualifications of the commissioners, as will gradually result in the establishment of sub-departments with each of the commissioners at the head of one of them.

The proposed charter defines the powers and duties of the board of public works with elaborate detail, as it was necessary to do, in order to project a scheme of government which should not be in conflict with general state laws.

The board is empowered to employ the necessary clerical force. It must appoint a city engineer who shall be a civil engineer, having had at least ten years' practical experience. The city engineer is empowered to appoint such deputies as the duties of his office require.

The board must also appoint a city architect, but the employment of an architect is made obligatory only pending the completion of the new city hall. It must also appoint a superintendent of public works who must be a master builder and who will have direct supervision of the construction of all public buildings.

The board is given power to enter into contracts for work authorized by the supervisors on recommendation of the board and in emergency cases, or, where repairs do not exceed a prescribed limit, they may proceed by days' labor. The expense of street work must be borne by property fronting on the streets, in proportion to the frontage, until the street has been paved with stone or other approved material, and has been formally accepted by the board of supervisors. Subsequent to such acceptance the full cost of further improvement and repair falls upon the city.

Street-car companies, occupying portions of the street, are required to pave these portions and to keep the pavement in repair.

Certain streets are reserved to the public as boulevards, and it is provided that no franchises for the construction of street railroads shall be granted on any street thus reserved.

The board of public works is to be the proper commission to act in the matter of widening and extending streets or opening new streets, and is required to devise a general system of drainage, which shall embrace all matters relative to the thorough, systematic and effectual drainage of the city. The board shall have power to dispose of garbage in any manner deemed to be for the best interest of the city.

The salaries of the commissioners have been fixed at $4,000 each. The city engineer is to receive $5,000; the secretary of the board, $2,000, and the architect and superintendent of public works, each $3,000 per year.

A separate park commission is established by the charter to consist of three commissioners, who are to serve without compensation, and are to have control of all parks and public grounds in the city. Most of the small parks and squares in San Francisco have heretofore been under the management of the superintendent of streets, the duties of whose office, except so far as they relate to parks, is now to be assigned to the board of public works.

It may be well to add to the foregoing that at the present time the officer known as superintendent of streets has charge of all street and sewer work; that the construction of the new city hall, which is nearing completion, is in charge of a commission of city officers consisting of the mayor, the city attorney, and the auditor; and that the building of school-houses and of engine-houses is now in

in the charge of the fire commissioners and the board of education.

Not only are many departments under the old system in charge of construction of buildings or other works, but, notably in the case of the office of superintendent of streets, there has been a persistent tendency manifest to construct without technical advice or supervision. The duties imposed by law on the superintendent of streets are those of the engineer departments of other cities. Work on streets and sewers must be done to his satisfaction and approval, and in most cases he prescribes the character and size of sewers and persists in the construction of a network of intersecting conduits so systemless in design that intelligent people may well marvel at the long tolerance of this evil in a civilized community.

The election of men to municipal office on national party lines at the dictation of party bosses, without regard to qualification, has in the case of this office, resulted in placing in charge of street and sewer work carpenters, iron molders, real estate dealers, custom-house inspectors, teamsters, marble cutters, brick layers and undertakers. Not a single civil engineer has been in that department, not even as an assistant.

The selection of commissioners under the new charter, if it be adopted, must be a very unfortunate one indeed, that will not result in better methods of conducting street and sewer work.

C. E. Grunsky.

MR. GRUNSKY is a civil engineer of prominence, and was one of the board of engineers of San Francisco formed by the board of supervisors in 1892, composed of Col. Geo. H. Mendell, Irving M. Scott and Prof. George Davidson.

CURRENT INFORMATION.

THE NORTHWESTERN PAVING EXPOSITION.

The Northwestern Paving Exposition held in Minneapolis and St. Paul, under the auspices of the Twin City Commercial Clubs, was opened in the Olson Building, in Minneapolis, on April 1st, continuing there until the 6th. The exhibits were then transferred to the Auditorium Building, in St. Paul, and the exposition was continued there from April 10th to 13th inclusive.

The exposition was modeled after the one held in Indianapolis, in 1890, and was the outgrowth of the need and the desire of the two cities for permanent streets.

Credit is due Mr. E. L. Danforth, secretary of the Minneapolis Commercial Club, and Maj. D. R. McGinnis, of the St. Paul Commercial Club, for securing exhibits for the exposition, and for the attentions shown exhibitors and visitors during their stay in the two cities.

It is estimated that about 15,000 people attended the Minneapolis, and about 4,000 the St. Paul exposition, the latter lasting only three days.

While the number of exhibits was not up to expectations, the interest created by the exposition was evident. Representatives in charge of the various exhibits report that the people who attended took advantage of the opportunity to learn something about paving, and plied questions freely.

MINNEHAHA GLEN, MINNEAPOLIS.

A VIEW OF MINNEHAHA FALLS, MINNEAPOLIS.

On Thursday evening, April 4th, an open meeting for the discussion of street paving was held at the Commercial Club Rooms. Mr. C. M. Carpenter, representing the Warren-Scharf Asphalt Company, and Mr. G. F. Culmer, championed asphalt pavements, while Mr. J. K. Caldwell, representing The Purington Paving Brick Company, and Mr. T. M. Walker, spoke in favor of brick.

Mr. Culmer also spoke on the value of regulating the width of wagon tires, being in favor of taxing wagons carrying a weight of over a ton on a tire of less than 2½ inches wide, and graduating the tax so that a wagon with a four-inch tire should be exempt from taxation.

It was intended that a number of papers on the subject of paving be read at this meeting, but owing to the absence of the gentlemen who were to read them, the idea of a regular program was abandoned, and the meeting culminated in a debate between asphalt and brick representatives as to the merits of the two kinds of paving. Granite and cedar blocks were also discussed some. This meeting, in conjunction with the exposition, created a widespread interest in better and permanent pavements, of which there is a great deficiency in the Twin Cities. Contracts for considerable paving were to have been let in April, but owing to the inability of the city council to decide on the kind of pavement to be laid, the matter was indefinitely postponed.

The exhibits included one by the Warren-Scharf Asphalt Co., of New York, showing models of their machinery for grinding, mixing, laying and rolling their asphalt; specimens of the raw material; a section of pavement taken from the intersection of Summit and Western avenues, Minneapolis, which was laid in 1891; and photographs of various streets laid with Trinidad asphalt.

LORING PARK, MINNEAPOLIS.

MINNEHAHA PARKWAY, MINNEAPOLIS.

Hennessy & Cox, of St. Paul, representing the Bermudez Asphalt Co., displayed photographs and blue prints of deposits in Venezuela; samples of crude material and a section of pavement.

Schillinger Bros., of Chicago, exhibited samples of crude asphaltum, asphaltum flux, and a block of German Rock asphalt.

The International Pavement Co., Baltimore, Md., had on exhibition samples of a composition asphalt and crushed stone paving block.

The American Bituminous Rock Company, Louisville, Ky., displayed samples of crude asphalt mined in Kentucky.

The American Asphalt Company, Columbus, O., exhibited samples of crude Utah asphalt, a section of asphalt pavement taken from a street in Salt Lake City, and a specimen of combined asphalt gutter and curb.

Hetherington & Berner, Indianapolis, Ind., showed blue prints of their asphalt machinery.

The Purington Paving Brick Company, Galesburg, Ill., exhibited sections of brick pavement laid on sand and concrete foundations, with cement and tar filling.

The Imperial Shale Brick Company, Canton, O., displayed samples of their round edge paving bricks and blocks.

The Barnard Brick Company, of Bellaire, O., had on exhibition samples of their paving bricks.

The Diamond Brick Company, Kansas City, Mo., displayed a section of roadway laid with Diamond brick and a specimen of shale used at their plant—dug 150 feet below the surface; also photographs of

A VIEW OF LAKE CALHOUN AND BOULEVARD, MINNEAPOLIS.

MOONLIGHT ON LAKE HARRIETT, MINNEAPOLIS.

streets in Kansas City paved by them.

Anderson & Barr Clay Company, Streator, Ill., had on exhibition samples of square paving brick.

Somerset & Johnsonburg Manufacturing Company exhibited samples of their paving brick and blocks.

The Iowa Brick Company, Des Moines, Iowa, exhibited a section of street pavement laid with their different paving bricks.

Samples of round-edged paving bricks and blocks were exhibted by the Royal Brick Company, Canton, O.; Logan Fire Clay Company, Logan, O.; W. B. Harris, & Bro., Zanesville, O.; Athens Brick Company, Athens, O.; Alton Paving, Building and Fire Brick Company, Alton, Ill.; A. O. Jones Brick and Terra Cotta Company, Zanesville, O.; Nelsonville Sewer Pipe Company, Nelsonville, O., and by C. J. Holman & Bro., Sergeant's Bluff, Iowa.

Thirteen granite dealers of St. Cloud, Minn., made a combined display of granite blocks for paving.

The Northern Granite Company, St. Cloud, Minn., made an independent display of granite blocks for paving, both rough and dressed.

The Minneapolis Sandstone Company exhibited samples of Kettle River stone, for paving and for curbing and flagging.

The Jasper Co-Operative Stone Company, Jasper, Minn., showed samples of jasper paving blocks.

Rothwell & Co., Little Falls, Minn., had on exhibition a new stone called "Quartzite," which, it is claimed, is as durable as granite, but has never had a trial for street work.

John Murphy, Columbus, O., exhibited a section of brick pavement taken from a street in Columbus, O., showing his grout filler after five years' service.

J. E. Snyder, Minneapolis, Minn., showed a section of cedar block pavement, with tar and gravel filling.

Fielding & Shepley, St. Paul, Minn., also showed a section of cedar block pavement with tar and gravel filling.

Thomas Libby, Minneapolis, Minn., exhibited a section of square cedar block pavement without filling.

W. H. B. Totten & Co., New York city displayed samples of "Oland" Portland Cement.

The Milwaukee Cement Company, Milwaukee, Wis., exhibited samples of cement rock, manufactured cement, and a section of concrete taken from "Soo" canal.

The Burch Plow Works, Crestline, O., and W. H. McDonald, Galion, O., exhibited specimen sewer inlets.

A drive through some of the parks and boulevards of Minneapolis, was taken under the guidance of Messrs. S. B. Loye and Wyman Elliott, members of the board of park commissioners and city council, and of Mr. W. M. Berry, superintendent of parks.

Loring park, a tract containing about thirty-six acres, set out in trees and shrubbery, and a lake in its center, was first visited; thence by way of Kenwood boulevard, passing a unique fountain, made of an immense solid block of granite, Lake Calhoun was reached. The lake, while quite large is very shallow, having a willow hedge fringing the banks, and a boulevard entirely encircling it. In summer bath-houses are located here, at which the attendance in season is averaged at 500 people a day.

LAKE OF THE ISLES, MINNEAPOLIS.

Lake Harriet Park, the next point visited, was reached by way of King's Highway, a drive that is kept in fine condition, being about 100 feet wide and having a well-kept grass plot in the center of it, extending the entire length of the drive, something over a mile.

Lake Harriet covers about 353 acres, is entirely bounded by a boulevard, and is called the "people's lake," of Minneapolis. A club-house and pavilion are located on the edge of the water, arranged so that concerts may be given in season. Often more than 200 row boats are out on the lake at one time.

The return to the city was made by way of the different boulevards, through the residence portion.

Minneapolis has a total park area of 1,552 acres, which includes 23.57 miles of boulevards. It is estimated that over $100,000 is spent yearly on maintenance and improvement of parks and boulevards in Minneapolis. *C. O. R.*

PAVING BRICK CLAY NEAR MINNEAPOLIS.

There is very little brick paving in either Wisconsin or Minnesota, and none in the Dakotas. The material most largely in use for street paving in these states is cedar block. In Minneapolis and St. Paul, asphalt is now being introduced, and there is also much agitation in favor of brick. Des Moines, Iowa, and Galesburg, Ill., are the nearest points at which paving brick is now manufactured. The freight rate on shipments from these points, is 13 cents per hundred pounds, which amounts to as much as the price at which brick are sold at the yards; consequently, efforts are being made to encourage the development of the paving brick industry near Minneapolis, and it is claimed that suitable clay has been found within 15 miles of that city. Brick which have been made from samples of the clay, for A. Humphreys, of Minneapolis, were recently subjected to tests, with the following results: Per cent. of abrasion 2 hours, 200 pounds, 6-pound castings, and 100 pounds of brick, 7.18; modulus of rupture on blades 6 inches apart, 4,022; pounds per square inch to crush, 17,934. Mr. Humphreys offers to furnish any information that may be desired by persons interested in the development of the business in this territory.

CAUSES OF VARIABLE RESULTS IN ASPHALTIC PAVING.

The annual reports of the city engineer and board of public works of Omaha present widely different views on the subject of asphaltic paving. The board strongly opposes the use on Omaha streets at this time of any asphalt but that obtained from Pitch Lake, Trinidad. City Engineer Rosewater, however, favors encouraging competition, and says that Bermudez and California asphalts, as well as the material obtained from Trinidad, "can, with equal skill, be successfully used in Omaha and other cities, and an occasional failure can not be pointed to as evidence of unfitness, but rather of lack of skill in handling."

Mr. Rosewater says that experience in Omaha, where the same material has been used under the same specifications with variable results, leads to the following causes as influencing results:

"First, differences in sand used in the mixture; second, variable size and proportioning of pulverized

stone dust; third, improper flux and lack of uniform heat in welting, subjecting mixture to excessive temperature and burning; fourth, variable mixing, causing a lack of evenness and uniformity in the mixture; fifth, carelessness in neglecting to thoroughly dry the concrete surface from all possible moisture before covering with asphaltum; sixth, the lack of uniform, even and sufficient compression with rolling machinery; seventh, care at the sides and all joints with man-holes, inlets, curbs and street car tracks, to obviate entry of water under layers where possible union may be lacking; eighth, the influence of very flat crowns in lengthening or shortening the life and wear of the pavement; ninth, variable street grade; tenth, the temperature of the base and air when laying the asphaltum.

"It will be seen by reviewing these ten of numerous other possible features that simply securing a cementing material which is, at best, 10 to 12 per cent. of the whole, is not the sole or main requisite to laying a successful asphalt pavement.

"Whilst Mr. Malo the noted French authority on asphalt pavements, gives as his opinion that the cracking of asphalt pavements is largely due to the use of oils in fluxing and softening the mixtures and deprecates the use of petroleum or other similar oils for such purposes, my limited observation on cracked streets in Omaha, leads me to largely attribute as the causes first, the laying of asphalt pavements late in the fall and subject to variable weather, and, second, to a lack of care in extracting every particle of moisture from the concrete bedding on which the asphalt is laid. This, in my opinion, can only be accomplished by the use of a body of hot sand and thoroughly sweeping it over the surface to enable it to absorb every particle of moisture before laying. In the case of cool weather it is impossible to compact the hot asphalt before some portions are chilled and, as a consequence, there will be an uneven thickness and an occasional development of blow holes. I have referred thus to observations of a mechanical nature on the street in laying asphalt pavements.

"In making and proportioning the mixture itself there is much room for careful study. The asphalt may have been refined and brought to a state of uniform purity and desired specific gravity, yet if the sand used is not perfectly clean and free from clay or other sediment, comprising as it does over eight-tenths of the bulk of the mixture, neglect in that respect may counteract the entire effect of the refining process of the asphaltic mastic. The use of petroleum residuum, a volatile material, that ultimately penetrates through the asphalt, creating a condition of porosity that may cause early disintegration, should be dispensed with and in its place an asphaltic flux itself should be used.

"The determination of the proportions in the mixture suitable to each kind of sand is also important, as it must be quite manifest that to prevent the particles from readily disintegrating under pressure and the striking of horses' feet, that the voids between the sand particles, as the sand comprises the main element of paving surface, should all be filled as nearly as possible, the material used, aside from the 10 or 12 per cent. of asphaltic cement, being the pulverized carbonate of lime. I do not pretend to assume the role of an asphalt expert, but

to simply outline to the public some of the numerous factors that must be considered in the development of a first-class asphalt pavement independent of simply securing a chemist's certificate from his laboratory as to the analytical result of a sample of asphalt representing of itself less than 10 per cent. of the surface material."

BRICK AND WOOD-BLOCK PAVEMENTS IN OMAHA.

Referring to the brick pavements in Omaha, Engineer Rosewater says:

"It is worthy of note that the first of these pavements, laid a little over five years ago, are in good condition, although only laid under a guarantee of one year. All pavements of this character, laid in the past three years, excepting on one street, are under a five years' guarantee, and the one exception, which is on a business street, is guaranteed for ten years. From the experience with brick this far, it is safe to say that with judicious inspection and correction within the first month after laying, and under a five-year or longer guarantee contract, a good pavement can be secured adaptable to light and moderately heavy traffic on gradients up to 10 per cent. In point of smoothness and cleanliness, it ranks next to asphaltum. It is more adaptable, and can, therefore, be laid cheaper on wood paved streets having a concrete base, needing repaving, than any material, excepting stone or wood itself. On light traffic streets its durability can be safely put at ten to fifteen years."

Mr. Rosewater advocates a 6-inch concrete foundation for wood block pavements, and favors using blocks four inches in depth. This is sufficient for the wear of six years, and the wood within that time decays. The pavement can be renewed every six years, he thinks, at a cost of from 60 to 65 cents a square yard.

CONVICT LABOR ON NEW YORK HIGHWAYS.

A thorough investigation has been made of the system and results of convict labor on the various branches of industry, by a committee of the New York legislature. Warden James C. Stout, of the Auburn prison, gave some valuable information concerning his experience in the matter; especially interesting was his statement regarding their employment in road construction. He says: "Last year nearly three miles of roads were built, and about $6,000 was expended. This amount includes $1,600 taken from the prison fund. In addition to the roads built, much repairing was done. About thirty convicts were worked on one two-mile stretch, and about fifty convicts on a one-mile stretch. Short-term men were mostly employed, who had money coming to them and who would naturally not try to escape. Only two guards were needed to keep the men in order. The convicts liked the change to outside work, and made no attempt to escape. The macadam road cost about $1,000 per mile, including cost of machinery. It could now be built at about $800 per mile. It is a good plan to work the roads with convicts, but it ought to be done under an engineer and on some general plan, not here and there on the highway. Distance from the prison was not a serious factor, as the convicts could be housed easily in warm weather." It is feasible, he thought, to use convicts to work on state roads. He preferred the short term men

on such work, as they are less likely to try to escape. He believed the roads between Sing Sing and Albany, a distance of 110 miles, could be advantageously worked by Sing Sing convicts, and that roads between Albany and Saratoga could be worked in the same way.

STATE AID IN HIGHWAY BUILDING IN CONNECTICUT.

A new plan for encouraging street paving in towns was proposed by George B. Burrall, of Salisbury, Ct., at a meeting in Hartford, on April 10. He urges legislation providing that the State shall pay to each town a bonus for the construction of a first-class, twenty feet wide, macadam road, $2,000 for the first mile, and $1,000 for each additional mile, not exceeding in all 10 per cent. of the entire length of the present highways of the town. For second-class road, made without trenching, with stone foundation, and not less than four-inch top dressing of crushed stone, $500 per mile for not exceeding 10 per cent. of entire town mileage, except that any town not electing to build its entire 10 per cent. of macadam road may add to its second-class the mileage short on its first-class. All roads should be made according to the general plan of the State highway engineer, and to be accepted by him or his authorized deputies. The estimated cost on this plan would be $2,284,000 in the State of Connecticut, and would be largely met by an issue of long-term bonds.

A SIOUX CITY COMMITTEE FAVORS BRICK PAVING.

The recent investigation of various methods of paving, made by a committee appointed for that purpose, at Sioux City, Ia., resulted in a recommendation of brick as a paving material for that city. The report contains the following: "Vitrified brick pavement has been steadily on the increase as a pavement in the cities of moderate size during the last ten years, and has given universal satisfaction, where good brick was used and laid upon a six-inch concrete foundation, and joints filled with sand and tar. During 1894, of seventy-five cities that reported, none reported any proposed block stone pavement, seven reported proposed asphalt pavement, and twenty reported proposed brick pavement, the total of the amount to be expended for brick being five times that of asphalt. The clay to mold the brick must be of a peculiar character, which will not melt and flow when exposed to an intense heat for a number of days, but will gradually fuse and form vitreous combinations throughout, while retaining its form. The resulting brick must be a uniform block of dense texture, in which the original stratification and granulation of the clay has been wholly lost by fusion which has stopped just short of melting the clay and forming glass. The clay while fusing must shrink equally throughout, thus causing the brick to be without any laminations of any exterior vitrified crust which differs from the interior. Such a brick will be incapable of absorbing any considerable amount of water, and will have great strength and toughness. The comparative merits of different bricks are readily determined by tests. We find from the reports of sixty-two cities having vitrified brick pavements that thirty-four used a concrete foundation six inches thick. We would recommend that a four-inch concrete foundation and two courses of brick be used, one laid flat, the other set on edge and the joint of the upper

course be filled with sand and tar. We are of the opinion that in order to secure a good and satisfactory pavement a concrete foundation is indispensable. Almost every city using brick pavements has had some portion of the work which has been unsatisfactory, but these failures can usually be traced to needless defects which could have been avoided in the choice of materials or in the mode of construction."

MUNICIPAL OWNERSHIP OF STREET OBSTRUCTIONS.

Municipal ownership of all obstructions that encumber the streets, both above and below the ground, is urged by Superintendent Drake in his annual report submitted to the city council April 8th, at New Bedford, Mass. He believes that this ownership should be secured either by building, or by allowing the company or corporation that may desire to build a permanent obstruction of this nature in the highway, to do so at its own expense; the obstruction to be allowed under the absolute control and direction of the city, and a certain per cent. of the gross receipts of the corporation to be paid to the city for the use of the valuable rights in the public highways; or, in lieu of a payment by the corporation for this valuable right, the corporation shall agree to give absolutely to the city the structure they may have erected and maintained at the expiration of not more than twenty years.

SANITARY INVESTIGATION IN NEW YORK.

A commission has been appointed by Governor Morton to investigate the sanitary and hygienic condition of the cities of New York. The commission is composed of Dr. Florence O. Donohue, Syracuse, president; Dr. Cyrus Edson, health officer; Alvah H. Doty, Dr. Daniel Lewis, Dr. Case Jones, Rochester; Attorney-General Hancock, State Engineer Adams, Dr. Adams, Watertown; Owen Cassidy, Montour Falls.

A SECOND-STORY SEWER.

City Engineer Rosewater describes, in his annual report, a novel and economical feature of sewer construction which he has introduced in Omaha. It is called a two-story sewer. It was designed by Mr. Rosewater in the interest of economy and equity as between property owners within the same district. The main sewer in places was thirty-six feet below the surface, and this involved enormous expense for connections for many property owners, and to obviate this he built a second-story sewer at a depth of thirteen feet, connecting at each end with the lower sewer, and flushing it automatically by one tank from a central point each way toward its terminus. The cost was assessed to the benefited property.

MUNICIPAL REPORTS.

Burlington, Ia.—The annual report of William Steyh, city engineer at Burlington, Iowa, shows that during the last year 9,752 lineal feet of stone, and 500 feet of concrete curbing were set, and 28,657 square yards of brick, 1,750 square yards of macadam, and 567 square yards of limestone block pavements were laid, at a total cost of $50,445.63. Of this sum $40,786.43, was assessed against abutting property, $63.19 collected from contractors for use of the city's street-roller, and $7,396.43 was paid by the city, leaving a balance of $2,199.58 to be paid by the city

during the present year, which amount constitutes the 5 per cent. retained by the city from all paving contracts for the term of one year from date of final estimate. The total length of all pavements in the city is 17.5 miles, which equals 15 per cent. of all the streets and alleys within the corporate limits of the city. Of sewers, 12,391 lineal feet, ranging in size from 9 inches in diameter to 18 feet span, have been constructed, which, with 38 man-holes and 36 catch basins, cost $24,382.41.

Mr. Steyh urges speedy action in the proposed reconstruction of Valley street sewer, from Front to Fifth street. During the year 346 lineal feet of culverts ranging in space from 4 to 6 feet, were constructed, and a number of retaining walls built, at an expenditure of $3,157.82. Also, 895 lineal feet of tile drains ranging in size from 9 to 24 inches, were laid, at an expenditure of $454.01.

Minneapolis.—The annual report of City Engineer Cappelen, of Minneapolis, shows that during the last fiscal year 10.06 miles of sewers were built, at a total cost of $270,650. He sets forth tests which were made under his direction, of stone and paving brick, on which he bases conclusions averse to brick, but advises the paving of one block with this material as a practical test. He favors mica schist for stone paving. He claims it is very close-grained and superior to granite in absorption, abrasion and strength, and readily cleaves two ways, and will not polish as highly as granite. It is obtained at Little Falls, which is within easy reach of Minneapolis. Reference is made to the conduit system, which has been started in Minneapolis, consisting of 2 and 3 inch pipe, laid between three and four feet from the curb line, and at an average depth of two feet below the surface of the street. Man-holes made of brick laid in cement, with the outside cemented, to prevent water from seeping in, were made in two sizes; the larger four feet square inside, and six feet in depth; and the smaller three feet square and six feet in depth.

Referring to the project for establishing a municipal electric lighting plant in Minneapolis, he says: "Plans and estimates in detail were made for a city electric lighting plant, the cost for 2,000 arc lights, of a thousand light plant, being estimated at about $76 per year for an all-night lamp. This price corresponds closely to prices lately obtained in Toronto, Ont. The city of Toronto prepared plans and specifications the same as Minneapolis did. The estimated cost there was $80 per light, but when bids were received from private companies, one proposition was obtained giving the price of $75. The city of Toronto, therefore, accepted this bid, and gave up its proposed municipal plant. The issuing of bonds for the proposed Minneapolis plant was voted upon by the people at the last election and was defeated, although this city is now paying $125 on the moonlight schedule, and $150 for the all-night service."

Mention is made of the fact that $1.75 per day was paid for common labor on municipal work during the last year, when the highest market price on private work was $1.50. If the city had paid no more than was paid by private arrangement, it would have made a net saving, the engineer estimates, of $39,000 on the season's work.

St. Louis.—The report of Sewer Commissioner Southard, for the fiscal year ending April 8, shows

that $38,094.26 was spent during the year for public sewer construction. For district sewers the sum of $109,288.96 was expended; for repairs, engineering and miscellaneous items, $71,659.67; total, $219,042.89. The St. Louis sewers, 396.47 miles, drain 9,000 acres of land. Mr. Southard recommends sewer work to the amount of $223,500, as soon as the appropriation can be secured.

Saginaw, Mich.—The annual report of the board of public works, as submitted to the council, contains a number of suggestions and recommendations in reference to paving. It cites the fact that a few years since Saginaw was known as one of the best paved American cities of its size, but that the residents are now confronted with miles of old wood pavements, worn and rotted out. While the board recognizes the merits of a new wood pavement, it advises that whenever it may be desired by property holders for any reason, it should be confined to the immediate traveled portion of the street, with gutters of brick or block stone when streets are curbed, and with gutters of cobblestone when stone curb is not used.

The annual report of Samuel S. Merrill, commissioner of streets, of Salem, Mass., states that no block paving was done during the last year. And he recommends the paving of New Derby and a portion of La Fayette streets, during this year. Much was done, however, in the way of repairs and grading, and in the extension of sewers.

MISSISSIPPI RIVER BRIDGES.

The character of bridge construction on the Mississippi river was the subject of a paper read recently before a meeting of the Western Society of Civil Engineers, at Armour Institute, Chicago, by Horace E. Horton, president of the Chicago Bridge and Iron Company. Mr. Horton, who confined himself strictly to highway bridges, of which there are twenty-seven in a stretch of 500 miles from Brainerd, Minn., to Muscatine, Iowa, said that below Muscatine there are no exclusively wagon bridges, the structures at St. Louis and Memphis being primarily railroad bridges. The length of these bridges varies, owing to the widening of the stream. Above Sauk Rapids, Minn., 100 miles above Minneapolis, bridges are not more than 400 feet long; at Muscatine a stretch of 2,500 feet must be spanned.

For the sub-structure and foundations of all the bridges from Minneapolis to Muscatine, pile foundations with timber grillage and with masonry are used. Some have, however, metal bent or towers to carry them to the proper elevation. Local quarries from Hastings to Dubuque furnish durable stone for bridge masonry.

Of the fourteen highway bridges at and below Minneapolis, only one is a draw, while thirteen have high channel spans, which are reached in some cases by natural, in others by artificial, approaches. The demands of navigation necessitate an elevation above high water of 55 feet clear, 45 feet more than is needed for a drawbridge. To reach this elevation at a six per cent. grade, the maximum incline to be attempted with safety, a length of 750 feet is required, necessitating in the case of low, level banks, approaches on one or both sides of the river.

Of the thirteen high bridges across navigable water, the channel span of one is an arch, six are

disconnected trusses and six are cantilevers. The spans reach all the way to 475 feet in length, the extreme elevation above the water being 200 feet, between the high bluffs at St. Paul.

None of the highway bridges below St. Paul has cost to exceed $50 per linear foot, some not more than $30, both for substructures and superstructures.

Mr. Horton says that the span bridges are very satisfactory, not a pier having ever given way, and the only collapse was due to defective construction in three spans at Sauk Rapids.

NEW PUBLICATIONS.

The Society for the Promotion of Engineering Education has published, in book form, a report of the proceedings of the second annual meeting held in Brooklyn, last August, in conjunction with the American Association for the Advancement of Science. The report comprises a volume of about three hundred pages, bound in cloth, and is edited by George F. Swain, Ira O. Baker, and J. B. Johnson. It embraces papers which were read at the meeting, together with discussions, including the following: "Common requirements for Admission to Engineering Courses," by F. O. Marvin; "Graduate and Post-Graduate Engineering Degrees," by Messrs. Ricketts, Swain, and Thurston; "Teachers and Text-Books in Mathematics and Engineering Schools," by Mansfield Merriman; "The Teaching of Engineering Specifications and the Law of Contracts to Engineering Students," by J. B. Johnson; "Mechanical Drawing in Technical Schools," by J. J. Flather; "German Technical Schools," Storm Bull; "The Organization and Conduct of Engineering Laboratories," by Prof. Lanza; "Minimum Laboratory Work and Equipment in a Civil Engineering Course," by Prof. Porter, etc. The price of the volume is $2.50. Copies can be had by addressing J. B. Johnson, secretary, Washington University, St. Louis, Mo.

"Drainage Work and Sanitary Fittings," is the title of a small volume of which William H. Maxwell is the author. It is published by *The Surveyor and Municipal and County Engineer*, of London. The volume is made up largely of articles which have appeared in *The Surveyor and Municipal and County Engineer*. It is freely illustrated. The subjects discussed embrace materials for drainage works of various kinds, joints used in drain pipes, intercepting traps, the disconnection and ventilation of house drains, the laying of drains, with general rules regarding house drainage, and some useful hydraulic memoranda.

LEGAL DECISIONS.

[Reported specially for Paving and Municipal Engineering.]

When Contracts Let Without Bidding are Void.—Where the laws provide that contracts for municipal improvements shall be let to the lowest responsible bidder, a provision in a contract which fixes the price for extra work without having invited bids on that subject is illegal, and payments at rates specified may be enjoined at the suit of the tax-payer. Moynahan *v.* Birkett (Sup. Ct., 2d Dept.), 31 N. Y. S. Rep. 293.

Right of a Contractor to a Lien.—In Kentucky, a person contracting for grading and macadamizing, under an ordinance for the original construction of a street, is entitled to a lien upon the property liable

therefor, upon completion of his contract, though the street is not curbed and guttered, his contract not including those improvements. Fox *v.* Middlesborough Town Co. (Ct. App. Ky.), 28 S. W. Rep. 776.

PERSONALS.

Miner C. Taft has been unanimously re-elected city engineer of Kalamazoo, Mich.

George Pierce has been appointed street commissioner for the next year at Pontiac, Mich.

James B. Goss has been re-elected city engineer and inspector of plumbing and sewers for one year at Fort Smith, Ark.

George W. Tillson, formerly city engineer of Omaha, Neb., has been appointed assistant to Engineer Lewis, of the bureau of local improvements in the city works department, at Brooklyn, N. Y.

SELECTIONS FROM THE PRESS.

COMPARISON OF THE COST OF MACADAM AND ASPHALT.

Street Superintendent Drake, of New Bedford, Mass., has reached the conclusion that macadam is not economical street paving for towns. He is quoted by the New Bedford *Standard* as saying: "Macadam, at best, is only a step in advance of gravel for city streets. For streets used very little by the general public or for streets used by light vehicles it is an excellent material. Locally we may be said to have no gravel. While the first cost of the macadamed street is light, repairs are quite heavy. If well and properly watered in dry weather the item of expense is increased. In streets subjected to much travel, such as Fifth and Pleasant streets, County, Cottage and Court streets, and the like, sheet asphalt on a concrete foundation should be introduced. I spent two days last fall very profitably in Buffalo, looking over and examining their pavings. Detroit, Cincinnati, Washington and Philadelphia are all using asphalt pavement, with most satisfactory and agreeable results. Hartford has been repeatedly quoted as a city of excellent pavements, so you can see that we are not alone in the expensive effort to keep macadamed pavement upon streets that should have been paved with a more permanent surface some years ago. We now have thirty-two miles of macadam to keep in repair. The average life of our macadam is not over six years. Some streets need rebuilding every two years. This is false economy. The public little realize how the traffic has increased upon streets that formerly were sufficiently paved with macadam only."

In connection with Superintendent Drake's statement appears the following: "A good idea of the extravagance of macadamized streets is given in the appendix to the report of the committee, where it appears that Boston, which has 211 miles of macadam, pays $556,129 for the maintenance of its streets yearly, while Buffalo, with 150 miles of sheet asphalt and practically no macadam, spends only $70,000 yearly for maintenance of its streets. Baltimore spends only $80,000 yearly for repairing paved streets. Out of sixty streets paved with sheet asphalt in New York five years ago, fifty-six have re-

quired no repairs and the remaining four only a few minor ones. Looking at it from an economical point of view, therefore, it is a sheer waste of money for Hartford to keep on restoring its old streets, which are not even paved with genuine macadam.

STREET PAVING IN PACIFIC COAST CITIES.

A recent issue of the Omaha *Bee* contained an interview with Mr. J. H. Winspear, chairman of the Omaha Board of Public Works, in which he gave his observations and opinions as to the merits of asphalt pavements in Los Angeles, Cal., and Portland, Ore. He is credited with saying that in Los Angeles and other California cities where California asphalt has been used, it goes to pieces during hot weather and crumbles up in bunches as big as a cabbage. The experience on the coast seems to indicate that the material is a failure where first-class paving material is required. The criticism is made by friends of California asphalt that Mr. Winspear has made no distinction between bituminous rock and California asphalt. It is claimed that that the reported bad condition of certain Los Angeles streets was due to neglect to make repairs of streets paved with bituminous rock. Referring to Mr. Winspear's statements regarding the sheet pavements of Portland the *Oregonian* of that city says:

"It simply remains to be said that no California asphalt was used in paving Washington street. This street was paved with California bituminous rock, which has proved unsatisfactory wherever used in Portland. Under the clear skies of the present month, Mr. Winspear would doubtless be able to draw the conclusion that bituminous rock is not asphalt. If he desires authentic information on the subject with a view of being enabled to refute some of his recent statements to the *Bee* regarding the result of his practical observations while visiting Portland, he can obtain the necessary knowledge by addressing any of the several thousand Portland property-owners who have been initiated into the mysteries of street paving with bituminous rock."

In refutation of Mr. Winspear's statements it is asserted that Alcatraz asphalt, which is a California product, has been in use for years in San Francisco, Los Angeles, Pasadena and other cities, with very generally satisfactory results. A contract was recently awarded in Pomona to Fairchild & Vincent, the highest bidders, for the use of this asphalt.

COMPARISON OF NEW YORK AND CHICAGO PLEASURE DRIVES.

"Chicago spends annually $78,000 to maintain Michigan avenue as a pleasure drive," said Major J. W. Howard, the engineering specialist, to a New York *Mail and Express* reporter. "This is for the items of repairs, sprinkling and cleaning alone, to say nothing of the expense of policing the street under the authority of the Park board.

"New York does not spend one-fifth of that amount, for all purposes, on Fifth avenue, over its entire length, from Washington square to the Harlem river.

"That," continued Major Howard, who is an authority on pavements, "is an illustration of the difference in public policy of the two cities. Chicago, with miles upon miles of beautiful streets, which are preserved as free thoroughfares, and upon many of

which heavy traffic is wholly or partly prohibited, still believes it is worth while to put Michigan avenue under Park rules and spend $78,000 per year in the maintenance of the driveway. New York, with only one highway for pleasure driving within reach of the greater portion of the people, pays little attention to the drive-way, establishes no regulations as to heavy traffic, and is now coolly asked to turn the street over to the cable car company.

"I believe that the time has come for New York to adopt a decisive and permanent public policy with regard to Fifth avenue. The defeat of the bill now pending in the legislature is not enough. The cable company will keep right on fighting, and, unless New York announces an ultimatum, some time the cable people may win. There is only one way to settle the question. Let the avenue be placed under control of the park board without delay.

"I do not mean that heavy traffic should be excluded from the avenue by hard and fast rules. The regulation of traffic should be determined by the records, showing by exact count the number and character of the vehicles using the street at different points and at different hours of the day. In this way the pressure of heavy traffic can be exactly located, and can be checked at any time.

"That is the system in use in Paris and Berlin, and it certainly seems more fair than the laying down of arbitrary rules, in advance of practical experience and a scientific analysis of traffic conditions actually prevailing.

"Chicago allows drays and delivery wagons on Michigan avenue only to deliver goods and then they must approach and leave the point of delivery from the nearest side street. Ice and milk wagons and some other deliveries with regular routes are made exceptions to the rule. All those matters, however, should be in the hands of the park board.

"Any change in the Fifth avenue pavement would be unwise, in my judgment, unless the street were placed under park rules. The existing granite blocks certainly do not fulfill the purposes of a pleasure drive. Macadam is the most expensive of all pavements, requiring one to two inches of its surface to be replaced every year. The wooden blocks set in cement were tried on Fifth avenue some years ago, just north of Madison square, being put in by an English company at their own figures. They were found not adapted to this climate.

"On the whole, the improved asphalt pavement—such as has recently been put in with so much success in Washington, Philadelphia, Paris and Berlin, and in some parts of New York—seems to best fulfill the requirements of pleasure driving and traffic. The granite blocks now on the avenue could easily be surfaced with asphalt, as about one-third of this kind of pavement in New York is now laid. If the crown of the existing pavement is so high as to cause slipping when surfaced with asphalt, that can easily be remedied by raising the sides of the street slightly, using some bituminous concrete for that purpose.

"I notice that some horsemen whose opinions have appeared in the *Mail and Express* object to the asphalt on the ground that it is slippery in wet weather. Unfortunately there are a few stretches of bad asphalt in the city which are responsible for all such prejudice.

Many drivers, who have noted this in wet weather on Madison avenue between Thirty-eighth and Forty-second streets, and on some of the cross streets, will never say a good word for this pavement.

"The material used in these cases was powdered limestone mixed with bitumen or asphaltum. Its use has been abandoned because of its excessive slipperiness when subjected to slight moisture. Only pavements of sand asphaltum are now laid, even by the companies which formerly used the powdered limestone mixtures. The relative slipperiness of the sand asphaltum mixtures to the limestone is as 5 to 307. These figures are derived from the record of the number of falling horses on the two kinds of pavement on Madison avenue from January 19 to February 21, 1891—a period of thirty days (Sundays excepted)—during which a close watch was kept. In the city of Washington, where asphalt pavements have been adjudged perfectly safe, the requirement is 84 per cent. of sand to 16 per cent. of asphaltum.

"Is the sand asphaltum mixture never slippery? Yes, when the pavement is covered with sheet ice it is bound to be. There is no way of avoiding that. But who wants to drive for pleasure in such weather? We only have about ten days of it during the average winter anyhow. At such times pleasure drivers stay at home, and the trucks and delivery wagons must move carefully and shoe their horses with corks.

"The question is, shall we endure noisy, unpleasant, ugly stone pavements all the year, because, for a few days of extreme blizzard weather in winter, the asphalt may be unfit for pleasure driving?"—*Interview in New York Mail and Express.*

DAVENPORT'S BRICK STREET PAVEMENTS.

Brick paving is indorsed by the *Democrat*, at Davenport, Ia., which says of it: "The test that Davenport has made of brick paving satisfies her that, given good brick, well laid, there is nothing better for her uses. She is going to lay more of it. Within the past four years she has made herself really a well-paved town. Another thing that her work seems to have fully demonstrated is that with the right sort of foundation, single-course paving is good as double-course. Next year will see the paved district, as well as the sewer district, greatly enlarged."

MORE PAVING BRICK PLANTS NEEDED IN THE EAST.

In PAVING AND MUNICIPAL ENGINEERING T. B. McAvoy, of Philadelphia, is quoted as saying, with reference to vitrified paving brick: "The reason why it is not more general in Eastern cities is because of the cost of transportation, which brings it into competition with asphaltum blocks and sheet pavements which are made at or near where the work is being done." This remark is deserving of more than passing notice, not only because the statement made is a well-founded one, but also because it clearly points out a practically new, unoccupied and profitable field for clay-workers in the East. It is a fact that over one-half of the cities using brick pavements at the present time are located in the states of Ohio, Indiana, Illinois and Iowa, which is readily explained by the fact that these are the states producing the greatest

amount of paving material of this class, and where, consequently, brick pavements can be put in at the lowest figures. None of the large cities of the East, except Philadelphia, have adopted brick pavements to any considerable extent, and the same is true of the majority of the smaller cities. Brick pavements present the same advantages for use in the cities of the East as in those of the Middle and Western states, and there is, unquestionably, in many sections of the East, a sentiment favorable to their adoption. If a supply of the material could be secured nearer home, thereby avoiding the excessive freight charges at present encountered, vitrified brick would be enabled to enter the field in a formidible way, and would undoubtedly receive favorable consideration and trial in a large number of cities which have heretofore confined themselves to other paving materials. The necessary material for the production of first-class vitrified brick undoubtedly exists in a large number of localities throughout the East, and those brick-makers of the East who first discover and utilize these beds of material surely bid fair to reap an abundant and substantial harvest.—*Clay.*

LETTERS FOR THE PUBLIC.

MAN-HOLE BOTTOMS.

To the Editor of Paving and Municipal Engineering:

Referring to the plan of "man-hole bottoms," described by Jens Hartwig, C. E., in the April numbes of PAVING AND MUNICIPAL ENGINEERING, I will say that the same plan has been used in this city for ten or fifteen years and that we like it so well that it will be continued. When I first read Mr. Hartwig's communication I thought I could find one exactly similar by Geo. E. Waring, published more than twenty years ago, but on looking through his work fail to find it. Nevertheless, I am satisfied that substantially the same construction has been in quite general use for years, and I predict that you will have a larger number of replies than you will care to publish if one-half the engineers who have used it accept the invitation to make the fact known. If I am mistaken in this respect I am quite certain that I am not mistaken in the fact that it is a good plan and its advantages are also applicable to man-holes that do not receive laterals.

Wm. M. Whitten.

South Bend, Ind., April 1, 1895.

To the Editor of Paving and Municipal Engineering:

The type of man-hole described by Jens Hartwig, C. E., in your last number, has been in use in this city since 1882, when Rudolph Hering, M. Am. Soc., C. E., was employed to furnish plans and details for a system of sewerage. I think the formation of the channels in the man-hole in this manner is also to be found in Baldwin Latham's work on sewerage.

H. Ward.

Binghamton, N. Y., April 1.

COST OF SEWERS CONSTRUCTED BY DAYS' LABOR.

To the Editor of Paving and Municipal Engineering:

I herewith append figures on the cost of some sewers which were built by days' work and under my

direction during the past winter, which I think will compare favorably with any like work done this winter when it is understood that in the excavation is included about 800 cubic yards of solid granite:

COST PER LINEAL FOOT.

Location.	Size—feet.	Length, Feet.	Stone.	Pipe.	Cement	Ex., etc.	Total.
Phillips ave., bet. 3d and 4th sts.	5 by 7.5	454	$3.165	$0.013	$0.665	$9.99	$18.833
Phillips ave., N. of 3d st.	4 ft.	8	1.95		.445	9.00	11.395
Overflow at 3d st.	3 ft. 10 in. by 8 ft.	45	8.49		.715	1.33	5.595
Temporary outlet	2 ft.	360		.935		3.16	4.095
Phillips ave., S. of 4th st.	40 in.	6	1.75		.406	6.00	8.155
Fourth st.	4 ft. 2 in. by 6 ft. 3 in.	134	2.435		.555	1.52	4.51

J. M. James, City Eng'r.
Sioux Falls, S. Dak., April 6, 1895.

STREET IMPROVEMENTS IN FREEPORT, ILL.

The city of Freeport is in that critical stage of her life when she feels too big to be called a village and yet is somewhat lacking in the experience of a full-grown city.

Five years ago a progressive mayor succeeded in paving about a mile of street with cedar blocks, in spite of quite a respectable number of prominent citizens who, most of them, having accumulated a reasonable fortune in Freeport, felt quite astonished to be called on to pay for improvements.

As they always had had their own way, they formed a syndicate to fight the assessment before the courts. Through some technical defects in the ordinance they won their suit. The city council, however, immediately passed a new ordinance to assess the property owners for the same pavement. The corporation counsel, by this time, had gained experience enough to draw an ordinance without loop holes, and finally the city was victorious. This will probably stop the suing business for a while.

Two or three years ago we built twenty-two miles of sewers, on the five years' installment plan. Then, also, we had a syndicate organized to fight the assessment, but partly because the ordinance was faultless, and partly because the paving syndicate had not been successful, the fight was dropped before it was begun.

Finally, two years ago the mayor as well as the council, fully awake to the interests of the city, bought a supply of tools and machinery, including wheel scrapers, street grader, a stone-crusher, with an engine to run it, a steam roller, etc., and ordered about a mile of street to be macadamized and a mile to be paved with cedar blocks. There we met with new difficulties.

The old paving had been done with very little engineering, as it was mostly through the business part of the city. There was hardly any grading needed. The curbs were made of our native stone of the Galena kind, full of sand pockets, some capable of resisting the weather pretty well, while others would crumble off the very next year;

some four inches thick, some twelve. The streets were not leveled crossway. In some places the gutter on one side of the street flows over the crown to empty into the gutter on the other side. No provision was made for the surface water which was allowed to find its way according to the law of gravity into the adjacent streets if it had a chance to do so, or straight down the street if no other outlet would present itself, occasionally stopping in some one's cellar on its way down to the river.

As those streets proposed to be improved were in the most aristocratic part of the city, some of the wealthy citizens could not be made to understand that it was necessary to grade down and sacrifice a few trees they had planted, in order to improve the street. They could not understand why we should import curbstone from Ohio while we have a hill full of stone, or why we should build a storm sewer to take care of water that had always taken care of itself.

These gentlemen (I would like to mention that there were ladies also) have used every means and every resource in their power to bear upon the mayor, the city council, even the humble city engineer, to modify, change or distort our plans and specifications, but to no avail. The mayor and the city council stood firm, not an inch of concession was made, and to-day everyone is pleased; even the kickers, if rumor is telling the truth, declare themselves satisfied.

Our block paving has no extra feature worth writing about, yet it is as good and as nice as any other block paving.

But our macadam, I think, deserves special mention. It has been made of two courses, the first one of three to four inches crushed stone, six inches thick at the center and four at the curbs, thoroughly rolled and compacted. The second course of one and a half to two inches crushed stone, same dimensions as the first, was topped with a slight course of screening, well sprinkled while rolling and the rolling process was kept up until the whole had become compact and smooth. Then the surface was perfectly hard and true and almost as smooth as asphalt.

Permission had been given for so many connections for water, sewer and gas that in spite of all precautions some of those trenches now show slight depressions. These we intend to carefully patch this spring with crushed stone well rolled. Then there is no doubt that the street will last until the stone wears out. Then if the city every two or three years replaces stone equal to the amount of wear there is no reason why such a street should not last forever and get harder and harder all the time.

The chief trouble with us here in Freeport is that our stone is too soft and does not cement together so well as pure limestone, and wears out proportionately faster.

Arthur Lagron, City Eng'r.

Freeport, Ill., April 10, 1895.

GOOD ROADS DISCUSSED BY SOUTHERN ENGINEERS.

At the April meeting of the Engineering Association of the South the Secretary read a communication from Mr. Ormsbee, on the subject of "Good Roads." He gave as a sample of good road-building the road from Hill City, near Chattanooga, Tenn., to and up Walden's Ridge. The grade here has been changed, by making the new road over three times as long as the old one, thus enabling a load of 2,000 pounds to be hauled up

with comparative ease, whereas on the old road, 1,000 had been very difficult to draw. The drainage and surfacing he reports as very good. The road was constructed by the convicts of the county, under the direction of a competent engineer, which serves as a demonstration of the fact that good results can be obtained by the employment of convict labor in this direction. He calls attention to the vastly better frame of mind in which the public might be now, had some such method as this been employed in the disposition of convict labor by the State, instead of the purchase of coal lands and farm and the contract for an elaborate penitentiary. He asserts as the hardest factor to overcome the conservatism that prevents the people from trying anything new.

In the general discussion following, Major Locke indorsed the views expressed by Mr. Ormsbee. He advanced the suggestion that this question was not one needing discussion by engineers, so much as it did getting the people to more fully realize the necessity of good roads. Referring to the request of the committee of the present legislature having this question in charge, that this Association offer them suggestions as to framing the law contemplated, he suggested that it should be made a sort of local option question, in order that the counties first adopting it might serve as object lessons to the rest.

Mr. J. S. Walker gave it as his opinion that the present road law was largely responsible for our poor roads, giving instances from Alabama, where similar laws had been abandoned and splendid roads built with convict labor.

Mr. Brown spoke from the standpoint of both the farmer and the disinterested party.

On motion, the following committee was appointed to confer with the committee of the legislature on this question: Maj. Locke, J. S. Walker and W. G. Kirkpatrick.

The following then reported on journals: Schuerman, *Engineering;* Leftwich, PAVING AND MUNICIPAL ENGINEERING; Pagelsen, *Engineering Magazine.*

The subject of "City Street Paving" was chosen for the next discussion. Leader, Mr. Leftwich.

Herman D. Ruhm, Secy.

MACHINERY AND TRADE.

THE FURNAS STREET-SWEEPER.

A public trial was given the new Furnas street-sweeper, in Indianapolis, April 20, which proved eminently successful. The power to remove the dirt is produced by air thrown by a swiftly revolving fan. The machine is provided with an apron which is within five-sixteenths of an inch from the pavement; a current of air is turned on the pavement, and a counter current sucks the dirt up into the machine; as the dust passes upward it encounters a spray of steam, which mixes with it and causes it to settle into a receiver, from which it is dumped at regular intervals. This prevents any dust from being thrown into the air, and leaves the pavement perfectly clean and dry, obviating the necessity of sprinkling. It is probable that the practice of sprinkling asphalt pavements will be abandoned in Indianapolis, and the sweeping system adopted instead.

TRADE CATALOGUES.

Supplementary Bulletin No. 15, giving a description of new appliances in clay working machinery, has just been issued by J. W. Penfield & Son, of Willoughby, Ohio. It fully describes the various features of their No. 6 Auger brick machine, their automatic cutter for side-cut brick, their semi-automatic power cutter for side-cut brick, their No. 8 down cutting board delivery table, their No. 4 double die repress, and their special clay grinding mill.

The Dunn Manufacturing Company, of Pittsburg, have issued a small pamphlet, illustrated, giving a description of their extensible sewer brace, and its use in supporting the sides of excavations. The company has enlarged its works for manufacturing these braces, one of which they offer to send free to any one using other braces, for comparison in actual work. The catalogue also describes other special tools for contractors, which the company offers for sale.

E. M. Freese & Co., Galion, O., have issued a pocket edition catalogue of their brick and tile machinery. It comprises forty pages and is freely illustrated. It describes their mammoth Ohio and other machines for manufacturing paving, building and fire brick, as well as their pug-mills and various other tile machines, including their cutters and crushers, dry pans, bucket elevators, clay conveyors, etc. It is a desirable publication for people engaged in clay-working business and is in convenient shape for ready reference. In addition to the pocket edition an illustrated catalogue of 136 pages will be sent to anyone applying to the company.

"Chambers' Picture Book, No. 2, for Brick Manufacturers," is the title given to a very handsome publication of 40 pages, used by Chambers Brothers Company, of Philadelphia. The picture book shows by illustration rather than long descriptions (though much information is well set forth in this way), the merits of the various articles which are manufactured by the Chambers Brothers Company, for the clay-working trade. There are many strong testimonial letters in the book from paving-brick and other clay-working manufacturers, who are using Chambers Brothers' machinery. The company bases its claim for patronage on this statement: "We guarantee every machine we sell to give satisfaction to the purchaser. We make no finely-drawn contracts over which to "split hairs" at time for settlement, the question of acceptance or rejection resting simply upon the fact that the customer, after trial, either wants or does not want the machine offered." The picture book and descriptive catalogues will be mailed free on application to the Chambers Brothers' Company, Fifty-second street, below Lancaster avenue, Philadelpaia.

TRADE NOTES.

The purchase of a street road roller has been authorized at Warren, Pa.

A new paving brick factory will be operated at Catskill, N. Y., by Orr Bros.

Plans are being formed at Windom, Minn., to establish a second brick plant.

A company is being organized at Marblehead, Wis., to manufacture brick and tile.

Crosier Brothers, of Bellaire, O., will remove their brickyard to Sistersville, W. Va.

The Sheridan brick works, recently burned, at Sheridan, Ind., will be rebuilt.

The Oberfelder stone quarry, near Sidney, Neb., will be extensively developed.

A patent has been granted Wm. Claussen, Sheboyan, Wis., on an automatic bridge gate.

The question of purchasing a street road-roller is under consideration, at Medina, N. Y.

The Saginaw Clay Manufacturing Company, Saginaw, Mich., will be in operation about June 1.

The citizens of Hudson, N. H., voted, April 16, on the proposed purchase of a road machine.

G. V. L. Mellinger, Canton, O., has been appointed receiver of the Anchor Tile and Clay Company.

Atkins Bros., of Oskaloosa, contemplate starting a bridge manufacturing plant in Burlington, Ia.

H. Duys, Jr., 175 Pearl street, New York City, contemplates establishing a brick plant in New Jersey.

Messrs. Trostle, Meals & Troxell were appointed recently to purchase a stone-crusher for Gettysburg, Pa.

The secretary of the commercial club, of Mayfield, Ky., claims that the clay near there is suitable for paving brick.

The board of supervisors of New City, N. Y., has adopted a resolution authorizing the purchase of a stone-crusher.

Plans are being perfected for the establishment of an extensive paving brick plant at the Coon creek clay deposits, near Minneapolis. Albert L. Humphrey, of Minneapolis, will be general manager of the proposed company.

The Harland Brick Company, Shermanville, Ill., has purchased a brick machine of the Chambers Bros. Company.

The entire plant of the Frankton Brick Company, Frankton, Ind., was destroyed by fire, March 26. Loss, $4,000.

The Monmouth Mining & M'f'g Co., Monmouth, Ill., report business very good, with prospects for an excellent season.

A committee has been appointed at Chester, Mass., to awaken interest in the proposed development of the granite industry.

The St. Louis Pressed Brick Company's plant, located at Glen Carbon, Ill., was destroyed by fire April 14. Loss, $500,000.

An effort is being made to organize a company at Murphysboro, Ill., for the purpose of establishing a brick manufacturing plant.

An appropriation was recently made at Dalton, Mass., for a road machine with an amendment that the machine be bought this year.

The Mitchell Lime Company has been organized to build an extensive plant at Mitchell, Ind., and engage in the manufacture of lime.

The committee on new industries, of the board of commerce, Conneaut, O., are considering the matter of manufacturing vitrified brick.

The Drury brick yards, in Atchison, Kan., have been leased by Ramsey & Co., of Topeka, who will engage in brick making on an extensive scale.

The Galesburg Paving Brick Co. was awarded the contract for furnishing brick for the street paving to be done in Rock Island, Ill., this year, amounting to 2,500,000 brick.

An extensive brick maufacturing establishment will be located at Muncie, Ind., by John Durrell, a prominent brick manufacturer of Hamilton, O.

The output of the kilns of the Central Pressed Brick Co., North Baltimore, O., was attached, April 3, to satisfy a claim of C. B. Humiston, of New York.

The board of public works at Kansas City, Mo., has authorized the purchase of four garbage carts from the Austin Manufacturing Company, at Chicago.

The sand companies of St. Louis have combined, advancing the price of sand per load 200 per cent., and decreasing the revenues of the city about $2,500 per annum.

A committee composed of Messrs. Myers, McCampbell and Robinson, Crawfordsville, Ind., recently recommended the purchase of an O. S. Kelly steam road roller.

A company will be organized to operate the sand-stone quarry of R. M. Hoar, Houghton, Mich. The quarry is located at Portage Entry, and has never been worked.

Mr. James Levi, who recently purchased the Dubuque Pressed Brick plant, at Dubuque, Ia., has engaged George Walker, of Philadelphia, to superintend the works.

The Moline Stone Company, Moline, Ill., secured the contract for furnishing the government with 2,600 yards of stone, to be used in the construction of a dyke along Sylvan Island.

The Mehrhop Brothers' brick manufacturing plant was sold at auction March 28, by J. P. Northrup, of Jersey City, the receiver, for $92,500. There is about $200,000 in unsecured claims, and the mortgage represents about $85,000.

A resolution was recently offered by Chairman Oppenheimer, of the street committee, at College Point, N. Y., to the effect that the committee be authorized to purchase a suitable street road-roller.

A syndicate, of which the Anheuser-Busch Brewing Company, Milwaukee, is the head, has secured a lease on 5,000 acres of asphalt lands for a period of twenty years, in the Indian Territory.

Dr. H. K. Hartzell and William Roth, Allentown, Pa., and James K. Mosser and Andrew S. Keck, of East Allentown, will engage in the manufacture of vitrified paving brick, near Allentown. Improved machinery will be purchased.

A partial test was made of material found fourteen feet below the surface of the ground, near Webb City, Mo., recently, and it was pronounced asphalt. The vein is eight feet deep. The test was made by F. W. Thomas, a chemist, at Webb City.

The works of the Brady's Run Fire Brick Company, recently destroyed by fire, at West Bridgewater, Pa., are being rebuilt. The buildings will be 55 x 120 feet in size, and will be equipped with all the modern machinery and appliances.

An experiment of making brick of a stratum of clay, which underlies the deposit of rock which has been used for street-paving purposes in Bartow, Fla., will be made by Messrs. Clark and Tyre, of that town, who have submitted to the council a proposal to pay the city 50 cents per 1,000 on all brick made, in return for the right to use the clay. The scheme is considered an important one, and one that will prove of incalculable benefit to the town.

The Crescent Stone Co., of which Jacob A. Harmon, ex-city engineer of Peoria, Ill., is a member, has a contract for supplying J. J. Jobst, paving contractor, with crushed limestone. The plant is located about four miles from Peoria.

A brick manufacturing company has been organized to operate at Clay City, Ind. W. H. Guirl, Schauwecker & Travis, W. H. Chillson, J. B. Collins and John W. Travis are interested. The machinery for the plant has been purchased.

Muscatine, Iowa, has a new industry in the Muscatine Concrete Paving Company, which will give special attention to the laying of tile and brick walks, driveways, curbing, gutters, street and alley crossings. The company is under the management of A. Kemble.

Mr. J. W. Robb, secretary of the Clinton Building and Paving Brick Company, says that in an output of 2,500,000 paving brick by his company last year, only 12,000 were below the standard requirements, and these were sold for building purposes. This is a remarkable record.

A conference of superintendents of the Barber Asphalt Company was held in Buffalo, March 25. Those present were: H. C. Bowen; P. W. Henry, J. C. Rock, P. C. Brennan, and William Henry, New York; H. H. Craney, St. Louis; C. O. Warren, Yonkers; H. M. Warren, Philadelphia; L. M. Baldwin, Wilkes-Barre; Geo. F. Brackett, Jersey City; W. C. Drake, Omaha; H. W. Kasson, Kansas City; W. H. Lober, Chicago; F. P. Miller, New Orleans; R. M. Richards, Washington; J. M. Wright, Ft. Wayne.

The San Antonio Sewer Pipe Company has been organized at San Antonio, Tex., to manufacture sewer pipe, terra cotta and tiling. The officers of the company are: President, Aaron French, Pittsburg; Vice-President, Captain Nelson Mackey, San Antonio; Treasurer, George W. Nelson, San Antonio.

A new bridge, intended to supersede the ordinary canal bridge, has been designed by William H. Robinson, Rochester, N. Y. The bridge has no structure above the surface, and can be operated so that the entire width of the canal is unobstructed. The floor is not to be more than four feet from the surface of the water.

The Van Denberg Laboratory of Chemical Industry, of Buffalo, New York, has been removed from the Lewis Block, to the eighth floor of the Erie County Bank Building, at the junction of Niagara and Main streets, in the center of the business district of Buffalo. The laboratory will be enlarged, and the work will embrace the several departments of chemical industry.

A plant is being erected at Slatersville, R. I., by the Rhode Island Granite Pressed Brick Company. This is a new branch company of the Granite Pressed Brick Company. Its officers are: President, Frank Harris; vice-president, John W. Cass; secretary, A. C. Hoye, of Bellefonte, Pa.; treasurer, S. P. Cook; agent at works, Beverly R. Potter, Lancaster, Pa.

A charter has been granted the Woodley Land Company, whose capital stock is $7,000,000. The principal office will be located in Alexandria, Va., with G. L. Boothe as agent. The object of the company is to build water-works, gas

works, roads, etc. The officers are: President, J. J. Hemphill, South Carolina; vice-president, A. S. Porter, Boston; treasurer, A. Marcus, New Jersey; secretary, D. E. Fox, Washington.

The Decatur Leader Manufacturing Company, Decatur, Ill., has shipped brick and tile machinery to many different points during the last thirty days. Some of the sales are as follows: Mason City Brick and Tile Company, Mason City, Iowa; W. F. Harmon & Bro., Winchester, Ind.; Elmwood Brick and Tile Company, Elmwood, Ill.; Erwin & Snyder, Arcola, Ill.; David T. Torrance, Latham, Ill.; Cherokee Brick and Tile Company, Cherokee, Iowa.

A bed of shale has been found by the Marquis Brick Company, New Castle, Pa., which has been partially tested and found to resemble closely the clay from which Hornellsville brick is made. One lot of brick made from it has been tested in the tumbler at the Keystone Plow Works, and the loss was less than two per cent. after an hour in the tumbler. The company has found the clay in seemingly unlimited quantities, and great results are promised for the future.

The annual meeting of the stockholders of the Wrought Iron Bridge Company was held in Canton, O., Monday, April 1. Officers were elected as follows: President and chief engineer, E. J. Landor; vice-president, and treasurer, F. M. Wyant ; superintendent, W. P. Hall. Directors: E. J. Landor, F. M. Wyant, H. A. Kennedy, Job Abbott and J. Wall. The last year has been a very satisfactory one to the company, and the outlook for increased business for the present year is very encouraging.

A company of Houston capitalists has been formed to work the serpentine stone quarries in Llano county, near Llano. The deposit is one mile long and averages 1,800 feet in width. N. J. Badu, who owns the quarry, has been in correspondence with the mayor of Munich, where crushed serpentine is used for a street-paving brick, which gives more satisfaction than any other material tried so far. If successful in learning the composition for making brick, Mr. Badu will be in the market for new machinery.

The Raymond Bros., Chicago, Ill., who were recently burned out, have established an office in the Continental Building. They have recently applied for patents on improvements which they are putting on their impact pulverizer. They claim that while the fire delayed them somewhat, they are now running to their full capacity, getting out machines which have been ordered by Bliss Rock Paint Co., Vinton, Ia.; Calvin V. Graves, Natural Bridge, N. Y.; J. S. Prescott, Passaic, N. J.; T. E. Dougherty, Chicago; The Solvay Process Co., Syracuse, N. Y.; The Peoria Grape and Sugar Co., Peoria, Ill.; J. P. Lewis & Co., Beaver Falls, N. Y.; J. P. King & Co., Staten Island, N. Y.; John Doyle, Chicago, Ill., and H. Sellek, New York City. The Illinois Steel Co. are making arrangements for several machines for grinding slag.

The Gates Iron Works, which for over half a century has manufactured machinery on the two blocks between Madison and Washington streets, west of the Chicago river, in Chicago, have moved to new works fronting on Elston avenue, Bloomington road, Redfield and Stein streets, where they have

also a river frontage of over 200 feet. They will have a branch office for the convenience of customers in Chicago, at Room 1205 Stock Exchange Building, corner of La Salle and Washington streets. The main machine shops at the new works is one of the best of its kind in the west. It is 330 feet long, and 75 feet wide, and is built of steel and brick. All the tools in the shop are operated by six electric motors, receiving their current from large generators in the power-house. The works include other large buildings. The Chicago, Milwaukee and St. Paul, and the Chicago Northwestern Railroad Companies, each run directly into the grounds. And the works are also reached by cable roads.

Newly incorporated companies: Eastern Bermudez Asphalt Paving Co., capital $75,000, New York; Continental Asphalt Co., capital $2,000,000, East St. Louis; Bellefontaine Stone and Lime Co., capital $12,000, Bellefontaine, O.; Stinesville Stone Co., capital $100,000, Chicago; Cook Stone Co., capital $10,000, Minneapolis; Mason Granite Co., capital $100,000, Concord, N. H.; Wilson & Thatcher Construction Co., capital $5,000, Chicago; Lorain Brick Co., increase of capital stock from $50,000 to $75,000, Lorain, O.; Massachusetts Granite Pressed Brick Co., capital $50,000, Portland, Me.; Wisconsin Quarry Association, capital $50,000, Genesee, Wis.; Murphy & Lorimer Brick Co., capital $40,000, Chicago; Gem City Paving Brick Co., capital $30,000, Riverside, Ill.; Atlantic Quarry and Construction Co., capital $6,000, Atlanta, Ga.; Standard Clay Co., capital $70,000, Columbus, O.; Chattanooga River Brick Co., Chattanooga, Tenn.

A new foundry and clay-testing department is being constructed by the Frey-Sheckler Company, of Bucyrus, O. Recent sales have been made by the Frey-Sheckler Company, as follows: Norwood Park Company, Norwood, Cincinnati; Minerva Paving Brick Company, Minerva, O.; McInnes Brick Manufacturing Company, Philadelphia; A. O. Jones Brick and Terra Cotta Company, Zanesville, O.; Anderson & Barr Clay Company, Streator, Ill.; J. Switzer, Helena, Mont.; A. Steiger's Sons, San Jose, Cal.; Steep & Washburn, Streator, Ill.; Olney Paving Brick and Tile Manufacturing Company, Olney, Ill.; Harris Bros. & Lane, Zanesville, O.; Utt Bros., Springfield, Ill.; Green Lake Granite Company, Utley, Wis.; Barnard F. Weber, Chicago, Ill.; Kleymeyer & Klute, Henderson, Ky.; Mt. Leonard Brick and Tile Company, Mt. Leonard, Mo.; M. A. Mines, Emerson, Neb.; R. H. Savage Brick Company, Reading, Pa.; American Fire Brick and Clay Company, Mineral Point, O.; F. A. Griffin & Co., Griffin, Ill.; Pioneer Fire Proofing Company, Chicago.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

It is believed that cedar block paving will give way to slag for road-making in Ashland, Wis

A two-thirds majority was shown for asphalt paving in a vote of the Minneapolis council for paving bids received April 12.

The board of public works at St. Paul, Minn., has ordered Hennessey & Cox to proceed with the work of paving the whole of Seventh-st. with asphalt.

V. D. Eichenlaub, paving contractor, Erie, Pa., has requested that California sheet asphalt be admitted to competition with Trinidad and Bermudez asphalt.

A street paving bill has passed both houses, relating to special assessment for improvement in cities, designed to legalize the collection of taxes made for street paving in Milwaukee.

The council committee of streets of Kalamazoo, Mich., strongly recommends that in the future there shall be only permanent paving on the business streets. It says temporary work is poor economy and "a criminal use of money."

The city engineer at Cincinnati has been directed to prepare an amendment to the specifications for asphaltic improvement so as to include Trinidad and Bermudez Pitch lake asphalt, and submit the specifications to the board of administration for consideration.

A party of city officials of Newburgh, N. Y., consisting of Mayor Odell, Aldermen Todd and Robinson, Charles Caldwell, H. B. Beckman and Mr. Orr of Orr & Dwyer, visited Philadelphia, York and Lancaster, Pa., recently to inspect some asphalt pavement laid by B. F. Richardson & Co. of Philadelphia.

The lowest bids ever made in Brooklyn, N. Y., were received April 10 for repaving nine streets with asphalt. The bids were submitted by the Trinidad asphalt paving company, the Fruin-Bambrick construction company, Cranford & Co., Bermudez asphalt company and E. J. McKeever & Bro. The bids ranged from $1.44 to $1.97 per square yard.

The directors of the Minneapolis Commercial club have adopted resolutions recommending engineers, contractors, architects, etc., to favor in their estimates, whenever it can be done, Minnesota building stone, brick, etc., for building operations and street work.

The proposition to abolish paving rebates at Erie, Pa., has resulted in calling for a citizens' committee to protect the interests of the laboring and poor people.

The streets of DeLand, Fla., are being paved with shell obtained at DeLeon Springs and New Smyrna. The shell is put on to a depth of nine inches, after which it is rolled with a five-ton roller. The material is said to make a splendid street, with a firm, even surface which sheds water like brick. About five miles of this road will be constructed, and the commissioners have under consideration a proposition to pave the road to Orange City, five miles south of DeLand.

CONTEMPLATED WORK.

Fourth-st. will be paved at Sedalia, Mo.

Street paving is contemplated at Elwood, Pa.

North Main-st. will be macadamized this summer at Brown, Ia.

W. Utica-st., from the upper bridge to Liberty-st., Oswego, N. Y., will be paved.

A petition is being circulated for paving Wright-st. with asphalt, at Newark, N. J.

Second-st., from the Bijou theater to Sycamore-st., Milwaukee, Wis., will be paved and curbed.

The residents on Washington-st., Wilkesbarre, Pa., have circulated a petition for an asphaltic pavement.

Petitions have been circulated for paving McKean and Fallowfield-aves. and Fifth-st. at Magic, Pa.

A scheme has been inaugurated at Flushing, N. Y., for macadamizing a number of streets in various parts of the town.

The ordinance for paving Second-st. with vitrified brick, at Seattle, Wash., is being considered by the council.

The village council of Ithaca, Mich., will investigate the expense of the proposed paving for Main-st.

Cement sidewalks will be built on the south side of Main-st., from Washington to Green, at Crawfordsville, Ind.

Resolutions have been passed at Dayton, O., for paving Court-st. and North-ave. with asphalt, brick or block.

The council at Princeton, Ind., has been considering for some time the proposition to pave the streets of the court house square and one block each way on the four principal streets. No definite action has been taken, however.

The board of public works at Lansing, Mich., has adopted plans and estimates for macadamizing Michigan-ave.

The ordinance for paving Clay-ave., between Olive and Gibson-sts., Scranton, Pa., has been favorably reported.

Action is being taken at Charlotte, Mich., to have the business portion of the town paved with brick instead of stone.

Legislation has begun for curbing and paving and otherwise improving a great number of streets at Allentown, Pa.

Plans and specifications for street-paving have been prepared by Charles E. Ball, city engineer at Lockhaven, Pa.

Favorable reports have been made upon resolutions at New Orleans, La., for Schillinger pavements in Annunciation-square.

Plans and specifications are being prepared for paving S. Robert-st. for a distance of seven blocks, at St. Paul, Minn.

Bids will soon be advertised for, for an asphalt pavement on Prospect Hill Pittsburg. Asphalt is also favored for Lake-ave.

The council of Ottumwa, Ia., will probably order a layer of asphalt to be spread over the paving on the Church-st. race track.

A resolution has been offered in the city council at Defiance, O., for paving with brick, or asphalt, Clinton-st., from Fifth to Front.

There has been legislation at Newark, N. J., for paving a part of Summer-ave. with asphalt, and St. Francis-st. with granite blocks.

The property owners on Washington-ave., Detroit, Mich., have signed a petition for a cedar block pavement on concrete foundation.

A petition has been circulated at Plymouth, Pa., for paving the upper end of Main-st., from the Bull Run crossing to the borough line.

A petition has been presented to the board of freeholders of Somerset county, New Jersey, asking that the county roads may be macadamized.

Resolutions of intention have been declared for remacadamizing View and Falcon-aves. by the board of supervisors at San Francisco, Cal.

Luther Dean, Taunton, Mass., writes that an appropriation of $15,000 for granite paving and $15,000 for concrete walks has been made.

The question of paving the streets within the fire limits of the city and the sidewalks in all parts of it is being considered at Meridian, Miss.

The council at Waynesburg, Pa., has taken action towards paving the sidewalks on Richhill, Washington and Franklin-sts. and Third-ave.

Resolutions have been adopted at Providence, R. I., for paving Broadway, from Aborn to Jackson, with granite blocks, and from Jackson to Barton with asphalt.

The residents on Canal-st., between Lexington-ave. and Robin-st., Albany, N. Y., are endeavoring to have that block paved. The block is but 1,000 feet long.

Ordinances have been passed at Cincinnati, O., for paving Pancoast, Cooper and Stephenson alleys with brick, and Baum alley with granite blocks.

M. J. Maes, city clerk at De Pere, Wis., writes that a petition is in circulation for paving with blocks 1,000 feet of Broadway-st., which will be acted upon May 6.

The joint improvement committee at Lexington, Ky., has recommended an ordinance requiring the reconstruction of N. Limestone and Vine-sts. with brick.

A resolution has been passed at Greensburg, Ind., for paving the sidewalks of South and East-sts. with stratified limestone, hard pressed brick or asphalt.

The city council of Perth Amboy, N. J., has published notice of intention to macadamize Fayette-st., from the New Brunswick turnpike to Staten Island sound.

The county commissioners of Hamilton county rejected all of the bids received April 14 for paving Paddock road, near Cincinnati, and will readvertise for proposals.

Plans have been proposed for paving a mile of the principal streets and macadamizing the others, and replacing with flagstone the board sidewalks now in use at Crafton, Pa.

The town council of Jonesboro, Ind., passed a resolution April 19 for paving Main-st., from Bridge to Thirteenth, a distance of 6,500 feet, with brick and stone curbing.

The business men on Main-st., between A and B, at Hamilton, O., have signed a petition asking for the paving of that part of Main-st. with asphalt blocks on concrete foundation.

Plans have been adopted at Anderson, Ind., for paving a sixteen-foot driveway on each side of W. Ninth-st., leaving a twenty-four foot grass plat in the center and six-foot sidewalks.

A petition has been circulated among the property-owners on Paterson-st., at Paterson, N. J., asking the board of aldermen to lay an asphalt pavement on that street during the summer.

A petition has been presented to the East Washington council, Washington, Pa., asking for a pavement from the borough line out E. Beau-st. to Morgan-ave., a distance of 2,400 feet.

The board of public works at Kansas City, Mo., recommended April 9 the following: Paving Garfield-ave. with asphalt; Missouri-ave., Eighth, Sixth, Seventh and Hickory-sts. with granite.

About fifteen hundred feet of Chartiers-ave. will be paved this summer at Sheridan, Pa., preparatory to the borough being taken into "Greater" Pittsburg. A meeting has been held, also, to consider the advisability of paving about six miles more of the streets of the borough.

The street and bridge committee at Kalamazoo, Mich., favors the graveling of West, N. Park and Church-sts. The prospects for repaving N. Burdick-st. are also considered good by the committee.

A petition is being circulated at Trenton, N. J., asking that the paving on W. State-st., from Calhoun to the city line, be extended. The street is being paved from Willow to Calhoun by Michael Hurley.

The board of public works, at Ann Arbor, Mich., recently submitted a resolution to the council in which they recommended that Main-st., between Washington and Liberty-sts., be paved with vitrified brick.

A resolution has been passed at Mansfield, O., for paving W. Fourth-st., from its intersection with N. Main-st. to its intersection with Sycamore-st., with bricks, blocks or asphaltum, and resetting curbing.

A special election was held April 30 at Sault Ste. Marie, Mich., to determine whether or not bonds shall be issued to the amount of $100,000 for the construction and maintenance of county roads in Chippewa county.

The board of contract and apportionment has recommended to the common council at Albany, N. Y., the passage of a law for paving N. Pearl-st., from Clinton-ave. to where the present pavement begins, with granite or asphalt.

M. B. Fitch, city engineer at Mattoon, Ill., writes that bids will soon be advertised for paving three streets with brick, aggregating about thirty-two thousand three hundred and forty square yards. Also 11,000 square yards of Telford macadam.

A petition has been circulated at Appleton, Wis., for a cedar block pavement on College-ave., from Drew to Green Bay-sts. Plans have also been suggested for having that part of the avenue converted into a boulevard, with thirty-foot drives on each side, paved with vitrified brick.

The residents on Main-st., Fredonia, N. Y., are unanimously signing a petition for paving that street from Railroad-ave. to Water-st. In all probability, brick will be favored. Many business men and property-owners on Water-st. are discussing the advisability of paving that street also.

The board of street and sewer commissioners, at Norfolk, Va., have recommended that Taylor's lane be paved with Belgian blocks. The property-owners on Concord-st. have also presented a petition to the board, which has been approved, for Belgian block-paving on that street.

The board of public works at Omaha, Neb., has in contemplation the paving of one of the streets leading to the state fair grounds, which if carried out, will prove one of the largest expenditures in public works that the board has in contemplation. The work is not assured, but the general impression prevails that it will be generally favored. Either Leavenworth or Center-st. will be selected for the improvement.

Resolutions have been adopted for a brick pavement on Clifford-ave., the bids for asphalt having been rejected, at Indianapolis, Ind. Resolutions have also been adopted for brick and cement sidewalks on sundry streets. Plans are being prepared for an asphaltic pavement on Walnut-st., from Pennsylvania-st. to Massachusetts-ave.

The report for the proposed northern beulevard at Albany, N. Y., has been accepted. The plans show a length of 6,800 feet, at a cost of $20,000. The surface will be Telford macadam. Street Commissioner Gaus has reported that Dove, Spring, Broadway and S. Ferry-sts. ought to be repaved. The report and a recommendation for granite paving has been adopted.

Ordinances have been passed at Waukegan, Ill., for extending paving as follows: Madison, from State to County; County, from Madison to Washington; Washington, from County to West; Genesee, from Clayton to Grand. The estimated cost of the work is $22,764.62, or $2,064.37 more than for paving the business streets, contracts for which were recently awarded to M. L. McCarron of Detroit.

CONTRACTS TO BE LET.

Bids will be received until May 6 for paving gutters in the borough of Parsons, Pa.

Bids will be received at Ft. Wayne, Ind., until May 10, for paving with brick the sidewalk on the north side of Park-ave.

Bids will be received at Ft. Wayne, Ind., until May 10 for paving Hanna-st. from Creighton-ave. to the southern city limits.

sixth; $400. Vitrified brick, Ninth-st., from Cherry to Liberty; $300. Sheet asphalt, Chestnut-st., from Fourth to Eighth; $300.

Sealed proposals will be received until May 6 at Burlington, Ia., for grading, curbing and paving with brick Summer-st., from Angular to Vine.

Bids will be received until May 3, at Richmond, Ind., for constructing a brick sidewalk on the east side of S. Fourteenth-st. Foreign contractors' bids must be accompanied by a certified check for $500.

Bids will be received at Richmond, Ind., until May 17 for grading, graveling and bowldering the alley between N. Twentieth and Twenty-first-sts. A deposit or certified check for $500 is required on each bid.

Sealed proposals will be received until May 7 at Morristown, N. J., for paving with Telford and macadam pavement the roads and sections of roads in Morris county. Each bid must be accompanied by a bond and at least two sureties, in the sum of $500.

Sealed proposals will be received at Warren, O., until May 21, for paving with brick E. Market-st. and N. Park-ave. A certified check for $300 must accompany each bid. The bids received April 18 were rejected.

Bids will be received until May 17 at Cincinnati, O., for building the roads and approaches to the new university building. Each bid must be accompanied by a bond or certified check for not less than 10 per cent. of amount bid.

Sealed proposals will be received at Avondale, O., until May 10 for the improvement of Lexington-ave. and Shillito-st., according to plans and specifications now on file. Each bid must be accompanied by two disinterested sureties.

Sealed proposals will be received until May 6 at Cincinnati, O., for paving Kenyon-ave., from Baymiller-st. to Freeman-ave., with granite blocks, and furnishing new granite curbs for the north side. Each bid must be accompanied by two disinterested sureties.

Sealed proposals will be received until May 4 at Des Moines, Ia., for paving all of the alleys to blocks 1 and 11 in the towns of Ft. Des Moines with one course of vitrified brick, on a foundation of six inches of concrete and asphalt paving cement top filler.

Sealed proposals will be received at Erie, Pa., until May 6 for grading, curbing and paving each of the following streets: Trinidad lake sheet asphalt, Chestnut-st., from Eighth to Twelfth; deposit, $300. Sheet asphalt, Walnut-st., from Fourth to Eighth; $300. Asphaltum block, Sassafras-st., from Eighteenth to Twenty-

Bids will be received until May 15, at Haughville, Ind., for the following: Improving the sidewalks of King-st. by increasing them to a width of five feet and paving with artificial stone or cement, and with double walk stones on all street and alley crossings; graveling the roadway and paving the sidewalks of Emerich-st. with brick.

Sealed proposals will be received at Terre Haute, Ind., until May 7 for the following: Paving Fourth-st., from Ohio to Poplar, with brick and curbing the sidewalks. A bond of $200 must accompany bid; paving the alley between Wabash-ave. and Ohio-st., from Seventh to Ninth, with brick, and curbing the sidewalks. A bond of $200 or sum equivalent thereto must accompany bid.

CONTRACTS AWARDED.

Brennan & Nutter were awarded the contract for 17,000 yards of street paving at Newark, O., recently.

The contract for paving Catherine-ave. was awarded to Henry Roth by the board of trustees at Lagrange, Ill.

The contract for macadamizing a road at Prattsburgh, N. Y., has been awarded to Henry S. Eveline of Waterford for $15,000.

The contract for paving Pittston-ave. at Avoca, Pa., has been awarded to Healy & Tate of Pittston for 60 cents per square yard.

Booth & Flinn, Pittsburg, secured the contract for all of the repairing to be done this summer in that city, which amounts to about $200,000. The bids are the lowest ever made for repaving.

Paving contracts have been awarded at Wooster, O., to George B. Herring of Mansfield and Palmer & Betsow of Wooster.

The contract for paving Vine-st., from Hollister to Inwood park entrance, Cincinnati, has been awarded to J. M. Quill for $8,364.93.

The contract for paving Prospect and Church-sts., Marion, O., has been awarded to the American asphalt company of Columbus, O.

The contract for paving Napoleon-ave., from Hagan-ave. to Telemachus-st., New Orleans, La., was awarded to the Rosetta gravel company.

The contract for constructing sec. 1 of the subway, extending from Boylston-st. to West-st., Boston, was awarded to Jones & Meehan for $136,602.

The contract for paving Sparks and Bank-sts. with rock asphalt at Ottawa, Canada, has been awarded to Roger, McLean & Co., for $56,063.

The Rochester vulcanized pavement company was awarded the contract at Rochester, N. Y., for an asphaltic pavement on Garson-ave., for $43,927.65.

The Narragansett improvement company of Providence, R. I., was awarded the contract for 6,200 square yards of paving for Thames-st., at Newport, for $16,326.

The contract for paving Second-st., from Cherry to Washington, and from Washington to Bozza-sts., at Alton, Ill., has been awarded to Wolf & Maupin at $1.72 per square yard.

The contract for paving Livingston-ave., between Broadway and Ten Broeck-sts., with granite blocks, Albany, N. Y., has been awarded to George and Jacob W. Holler, jr., for $10,414.96.

V. D. Eichenlaub, who has the contract for laying 12,000 yards of asphaltic pavement at Erie, Pa., has contracted with the Western asphalt block and tile company of New Castle for the blocks.

The T. B. Townsend brick and construction company has been awarded contracts for paving E. Main, Monroe, Underwood, Spring, Malinda and N. Sixth-sts., and Greenwood and Luck-aves. at Zanesville, O.

The common council at Trenton, N. J., awarded the contract for paving W. State-st., from Willow to Calhoun, with vitrified brick, to Michael Hurley for $8,409.50. Pope-Oliphant repressed brick will be used.

The Buffalo paving company secured the contract for paving Cornwall-ave., from Delavan to Warwick-ave., Buffalo, N. Y., with American bituminous rock, for $30,310. Also Sheridan-st., from Main-st. to D. L. and W. R. R., for $12,098.

The contract for paving the Galena road with brick has been awarded to the Talbot paving company of Detroit by the village board of Averyville, Ill. The contract price is $38,357.68. This includes sandstone curbing, gravel concrete and stone concrete base.

Paving contracts were awarded at Davenport, Ia., recently to the Edwards & Walsh construction company and to Flick & Johnson.

The Fruin-Bambrick construction company of St. Louis presented the lowest bid for the reconstruction of streets at Louisville recently.

The city council at Waukegan, Ill., awarded to M. L. McCarron of Detroit the contract for paving the business streets of the city with brick for $20,700.35. The paving will comprise 15,300 square yards of brick pavement and 4,400 lineal feet of stone curbing. Thirty firms bid on this work.

Paving contracts were awarded April 4 at Peoria, Ill., as follows: Third-ave., J. J. Jobst, $11,526.24; Madison-ave., Robert Clark, $4,550.60; Chestnut-st., Robert Clark, $4,165.60; Spring-st., James Deal & Co., $2,681.64; California-ave., Talbot paving company, $4,628.52; Commercial-ave., Robert Clark, $1,728.94; alley block 46, J. J. Jobst, $1,012.32; Liberty-st., Robert Clark, $7,066.42.

SEWERS.

The plans of Samuel M. Gray for the sewerage system of Syracuse, N. Y., practically divides the city into two districts, each arranged with reference to a common outlet.

An ordinance has been introduced before the city councils of Reading, Pa., providing for the purchase of Fritz island, on which to deposit the sewage of the city. The island is situated in the Schuylkill river several miles below the southern limits of the city. The plan is to collect the sewage at the outlets of the drains in scows and dump it on the island. This will, it is thought, preserve the waters of the Schuylkill from pollution by the drainage of river towns.

Cleveland's plan of carrying sewage into the bed of Lake Erie is disapproved by the Ohio state board of health, whose investigations have not enabled it to find any comprehensive scheme by which the water works and sewers are to be extended, until adequate measures have been taken to secure a study of the whole problem of water supply and sewerage for the city broad enough to meet the requirements of the city for many years to come. Three lines of work present themselves by which the city can improve the conditions, but the board is unable to decide from the information now available which of the three methods would be likely to yield the most satisfactory results, or whether two of them or three should be used in conjunction.

CONTEMPLATED WORK.

A sewerage system is contemplated for Elkton, Md.

A system of sewerage is contemplated for Dover, Me.

A system of sewerage is being agitated for Argyle, N. Y.

A sewerage system has been proposed for Fayetteville, Ark.

The question of sewerage is being agitated at Wampum, Pa.

A sewer is contemplated for West and Emerson-sts. at Monroe, Wis.

A cylindrical brick sewer will be constructed in Utah-st., at Toledo, O.

A sewer will be constructed in the alley between Suttenfield and Allen-sts.

The Broadway Brook sewer will be extended to Chapel-st. at Dover, N. H.

Plans are being made for a sewerage system for the borough of Lonsdale, Pa.

A petition has been circulated for a sewer on Mill-st. at Fergus Falls, Minn.

An ordinance has been passed at Waukesha, Wis., for the construction of a sewer.

The sewerage question will be investigated with a view of adoption at Somerville, N. J.

Three sewers, aggregating about one mile in length, will be constructed at Old Orchard, Me.

The question of building a system of sewerage is being agitated at Windsor Locks, Conn.

The residents of Montauk-ave., New London, Conn., have circulated a petition for a sewer and sidewalks.

M. B. Fitch, city engineer, Mattoon, Ill., writes that he city will soon advertise bids for about $7,000 worth of pipe sewers.

A sewerage system, known as the intermittent downward filtration system, has been recommended for Morristown, N. J.

A resolution has been passed at Youngstown, O., for constructing a sewer in Grace-st., from Belmont-ave. to Ford-ave.

M. J. Maes, De Pere, Wis., writes that the construction of about 1,000 feet of three or four-foot sewers is contemplated.

Fairhaven, Mass., has voted to accept an act of the legislature authorizing the city to borrow $80,000 for a sewerage system.

A bill has been passed in the legislature giving New Brighton and Port Richmond, N. Y., the right to build a joint sewer in Jewett-ave.

The sewer plans, maps and specifications prepared for Tunkhannock, Pa., by Alexander Potter, C. E., of New York City, are being considered.

An ordinance has been passed at Pittsburg, Pa., authorizing the construction of a sewer on Finance-st., from Braddock-ave. to Dunfermline-st.

Sewer extensions contemplated for this year, at Racine, Wis., are: English-st. sewer, from N. Erie to Green-st.; Duck creek sewer to the river.

A resolution has been passed by the city council at Des Moines, Ia., directing that Bird's run, from the river to Eleventh-st., be converted into a sewer seven feet in diameter and costing about $30,000. The conduit will be 2,938 feet in length.

The question of building a system of sewerage from the head of Broadway to Broadway bridge has again become prominent at Rochester, Minn.

The total length provided for in the proposed sewerage system of Steelton, Pa., is 68,220 feet, or 12.9 miles. The plans were made by George E. Waring, jr.

An ordinance has been passed at La Grange, Ill., for the construction of a twelve-inch tile pipe sewer, with manholes and catch basins, in Fifth-ave.

A resolution has been adopted at Plymouth, Ind., for the construction of a sewer 2,645 feet long, and to be known as the Jefferson-st. and Yellow river sewer.

The plans for the city's sewer at Elkhart, Ind., have been completed. It will be constructed on the land where the city buildings are to be erected, and will extend from an alley east of Main-st. to the Elkhart river.

An ordinance, appropriating $140,000 for the construction of a sewer in the bed of Alluvion-st., between Warner and Ostend-sts., has been signed by Mayor Latrobe, at Baltimore, Md. This sewer will be the last of the large sewers to be constructed in conformity with the plan of Assistant City Commissioner Kahler to provide for the surface drainage of west and southwest Baltimore.

The sewer committee of the board of public works, Newark, N. J., has published a notice of intention for the construction of a comprehensive system of sewers in several streets, with laterals. Twin pipe sewers will also be constructed in Washington-ave. The committee took an important step in the work of providing for the drainage of the sections of the Tenth ward by authorizing City Surveyor Adams to secure the services of Rudolph Hering as consulting engineer.

CONTRACTS TO BE LET.

Sealed proposals will be received at Buffalo, N. Y., until May 7, for constructing sundry sewers.

Bids will be received until May 13 at Yonkers, N. Y., for constructing a sewer in Webster-ave.

Sealed proposals will be received until May 16 at Omaha, Neb., for constructing a brick culvert on Jack-st.

Sealed proposals will be received until May 11 at Mansfield, O., for constructing a seventy-five foot section to the brick arch over "Ritter's run" on W. First-st.

Sealed proposals will be received at Cincinnati, O., until May 6 for constructing sewers in Vanhorne, Seventh and Barr-sts., Kenyon-ave. and Laurel alley. Each bid must be accompanied by two disinterested sureties.

Sealed proposals will be received until May 6, at Des Moines, Ia., for constructing a seven-foot, three ring brick culvert, 1,350 feet long, across and along all the the streets and alleys on which Bird's run crosses or runs along between the river and the storm overflow on W. Eleventh-st.

Sealed proposals are invited until May 3 at Richmond, Ind., for constructing the "Linden Hill trunk sewer." A deposit or certified check for $500 must accompany each bid of foreign contractors.

Sealed proposals will be received until May 20 at Richmond, Ind., for constructing a pipe sewer in the alley between Ninth and Tenth-sts., from the first alley south of Main-st. to S. A-st. Each bid of foreign contractors must be accompanied by a deposit or certified check for $500.

CONTRACTS AWARDED.

Weand & Lester, of Reading, secured the contract for sewers in Bristol, Pa., for $55,000.

The contract for constructing the West Bluff sewer system, at Peoria, Ill., has been awarded to James Deal & Co., for $277,000.

The city council at Redwood Falls, Minn., awarded the contract for building a sewer system to J. M. Maurier of Minneapolis.

Peter Jonte & Co. secured the contract for constructing the sewer on Delphi pike and Fountain-st., at Cincinnati, O., for $4,547.70.

The contract for building the Court and William-sts. outlet sewer at Rochester, N. Y., was awarded to Chambers & Casey for $14,517.60.

The contract for constructing the Washington-ave. sewer, at Racine, Wis., has been awarded to N. F. Reichert & Co. for $3,681.40.

George J. Baer of Kansas City, Mo., was awarded the contract for constructing the main sewer at Jefferson City, Mo., April 3, for $7,672.50.

The contract for sewer construction in Plainfield, N. J., was awarded to Honan & Son of Chester, Pa., for $60,000. The work will comprise twenty-two miles.

The contract for constructing sewers at Alton, Ill., was awarded to Wolf & Maupin at the following prices: Manholes, $32; catch basins, $28; twenty-one-inch pipe, $1.24 per lineal foot; twelve-inch pipe, 70 cents per lineal foot.

Sewer contracts were awarded at New Haven, Conn., April 3, as follows: Ellsworth-ave., A. Brazos & Sons, $578; Livingstone-st., A. Carroll, $579; Elm-st., Brazos & Sons., $2,583.20; Goffe-st. and Mt. Carmel-ave., C. W. Blakeslee & Son, $2,729.20; Edgewood-ave., A. Brazos & Sons, $3,481.20.

F. A. Dunham, C. E., Plainfield, N. J., writes that the contract for constructing trunk sewers in Westfield has been awarded to John Marsden of Utica, N. Y., at the following prices: Line "A," $14,888.35; line "B," $15,627.85. The contract for the laterals was awarded to Stratford & Hawkes of Brooklyn.

Contracts were awarded by the sewer committee at Minneapolis recently for the following: Three hundred thousand slop brick, C. J. Swanson, $6.50 per 1,000; sewer brick, 700,000, Northern hydraulic pressed brick company, $6.73; sewer pipe, John H. Rich company; special castings, Menzel foundry company, $24 per ton.

The board of public works at Indianapolis, Ind., awarded the contract for the W. Vermont-st. sewer to Horace H. Fletcher, April 9, at $1.25 per foot. The contract for a system of local sewers in California and Blackford-sts., Indiana-ave. and the first alley south of North-st. was awarded to Sheehan Bros. at $1.46 per foot.

WATER-WORKS.

A system of water works is advocated by the press at Bedford, Ia.

The question of a water supply is being agitated for consideration at Monroe, Ia.

Estimates are being made on the cost of a system of water works for Weston, W. Va.

Plans and specifications have been prepared for a water works plant at Bayfield, Wis.

A system of filtration will be adopted for the water supply at New Albany, Ind.

The question of water works erection will be submitted to vote at Huntington, W. Va.

Plans are being considered by the city council of Belleville, Ill., for a new water works system.

A water works and electric light plant is advised as a pressing need by the press at Seymour Ind.

The city council of Niles, Mich., will vote on bonding the city for $50,000, with which to complete the new water works system.

The inter-municipal water system proposition between Allegheny and Pittsburg, Pa., is before the councils again.

The trustees at Flushing, N. Y., have appointed W. E. Worthen consulting engineer to make plans for increasing the water supply.

The committee on the question of establishing a new water plant at Hawley, Pa., to be under the management of the town, reports progress.

The Tonawanda engineering company is endeavoring to interest the citizens of Akron, N. Y., in the establishment of a water works system.

A petition has been signed by the citizens of Augusta, Ark., asking that an improvement district be formed for the purpose of building water works.

Plans have been completed for the proposed new water works system for Topeka, Kas. Two plans have been submitted, either of which shows seventy miles of mains.

The question of water works is being agitated at the following places: Boonville, N. Y.; West Carthage, N. Y.; Antwerp, N. Y.; Theresa, N. Y.; Brush, Ia.; Belmont, N. Y.; Hutto, Tex.; Rensselaer, Ind.; Savona, N. Y.; Oxford, Ind.

A petition presented to the council at Hightstown, N. J., represents $421,640 worth of property, the owners of which are anxious for the establishment of a water works system.

Fred H. Pickles, city engineer of Winona, Minn., recommends the reservoir system in connection with an artesian well for the proposed system of water works at St. Charles, Minn.

Messrs. Walter Johnson, M. O. Reeves and H. L. Rost, council committee, and Levi Hege, city engineer, Columbus, Ind., visited Dayton, O., recently to inspect the water works system.

Plans have been completed for the erection of the proposed new water plant at Snow Hill, Md. The system will cost $18,000. J. R. Moseland, C. E., of Wilmington, Del., made the plans.

The common council at Corning, N. Y., has approved a bill to be submitted to the state legislature, for voting to bond the city for $70,000, for a general extension of the water mains of the city.

A new resolution of the pure water supply problem for Philadelphia has been presented by Mr. Joseph Wharton, who suggests tunneling under the Delaware and bringing the water from the rivers in southern Jersey.

Frank Knuckles has been appointed receiver of the Shelbyville and Warsaw (Ind.) water works plants, upon the complaint of the Knickerbocker trust company of New York, which was based on a default in the interest on $250,000.

The town council of Westerly, R. I., held a meeting April 11 and decided that if an agreement had not been reached in thirty days regarding the purchase of the Westerly water works, that water works would be constructed at a cost not to exceed the sum of $150,000.

Construction of water works systems is contemplated at the following places: Rushville, Ind.; Driftwood, Pa.; Paris, Ill.; Carthage, N. Y.; Cherokee, Kas.; Edmond, Ok. T.; Sellersville, Pa.; Montpelier, Ind.; Hedrick, Ia.; Havensville, Kas.; Waynesboro, Va.; Gallatin, Mo.; Madisonville, Ky.

The representatives of the city of Boston presented a bill to the sub-committee of the legislative committees on metropolitan water supply March 30, which provides that a commission of three persons constitute the metropolitan water board, who shall contract, maintain and operate a system of waterworks, the supply of water to be provided for eleven cities and twelve towns.

CONTRACTS TO BE LET.

Bids will be received until May 8 at Decorah, Ia., for extending water mains.

The board of aldermen at Scranton, Miss., resolved recently to invite manufacturers throughout the country to send in proposals for water works. The committee appointed to receive bids is: S. R. Thompson, C. E. Chidsey and George H. Huggins.

Sealed proposals will be received at Postville, Ia., until June 1, for constructing a system of water works.

Sealed proposals will be received until May 18, at Brazil, Ind., for reconstructing the water works system according to plans, specifications and drawings now on file in the city clerk's office. All bids must be accompanied by a certified check for $1,000.

CONTRACTS AWARDED.

Wells, Reichert & Co secured the franchise for water works at Kaukauna, Wis.

P. McDonald of Duluth, Minn., has the contract for a system of water works at Reedsburg, Wis.

The contract for constructing a water works system at Lyndonville, Vt., has been awarded to Flood & Sherrill.

H. Merigold, Lima, O., secured the contract for constructing a system of water works at South Whitley, Ind., for $13,160.

The city council of Madison, Ind., has leased the water works plant for fifteen years to Stribley & Walch for $6,200 per year.

The contract for constructing a system of water works at Elgin, Ill., has been awarded to Fairbank, Morse & Co. for $2,695.

The contract for a water works system for Seneca, Kas., has been awarded to James T. Broughal of Kansas City, Mo., for $29,200.

L. G. Hallock of Wheeling, W. Va., and Ward Bros. of Cadiz, O., secured the contract for the water works system at Cadiz for $25,500.

The contract for building a system of water works at Cuthbert, Ga., was awarded Herbert & LePeyne of Chattanooga, Tenn., for $37,000.

The city council of Corry, Pa., has awarded the contract for constructing a water works system to W. F. Witmer of Buffalo, N. Y., for $80,000.

The town council of Lonaconing, Md., granted a franchise for building and operating a water works system to Malcom Sinclair of Cumberland. Hoge & White of Wheeling, W. Va., have been retained as engineers.

BRIDGES.

A new bridge is to be erected over the Cocheco, at Rochester, N. H.

A new iron bridge will be built at Beaver dam, near Cockeysville, Ind.

A new bridge is contemplated on the Tanner road near Union Star, Mo.

A new bridge will probably be built between Cambridge and Boston, Mass.

A new bridge will be built across the Paw Paw near Benton Harbor, Mich.

Bids are invited until July 3 at Ukiah, Cal., for erecting two county bridges.

The plans for the new steel bridge at Hancock, Mich., have been completed.

Bids are invited until May 6 at Webster City, Ia., for constructing an iron bridge.

Brownsville, Tex., will vote on issuing bonds for constructing two iron bridges May 7.

A petition has been circulated to secure a bridge across Deer creek, near Pataskala, O.

The plans for the New York and New Jersey bridge bill must be filed on or before June 7.

Bids will be received until May 11 for constructing three iron bridges at Leavenworth, Kas.

The citizens of Weldon, N. C., will build a new iron and steel bridge across the Roanoke river.

A new county bridge will be erected across the Mahanoy creek, between Ashland and Girardville, Pa.

Plans are being prepared for a bridge across Fox river at the foot of Wisconsin-st., at Waukesha, Wis.

The Shafer bridge, the contract for which has not yet been let, will probably be built in July at Paris, Ill.

Bids will be received until May 11 at Port Huron, Mich., for constructing iron gates for Military-st. bridge.

The county commissioners of Ashtabula county, Ohio, have located the high level bridge at Spring-st., Ashtabula.

A steel bridge will be constructed across the Boyer river at Denison, Ia., by the Milwaukee railroad company.

Sealed proposals will be received until May 23, at Omaha, Neb., for constructing a pile bridge. Certified check, $25.

A bridge and culvert is proposed at Keosauqua, Ia., to cross the ravine between the depot and court house.

The board of public works at Louisville, Ky., has decided to build a new bridge across Beargrass creek at Lampton-st.

The board of freeholders of Middlesex county, New Jersey, contemplates the erection of a bridge across Cheesequake creek.

Plans and specifications have been made for a fine suspension foot bridge across the Maquoketa, on DeWitt-st., Dyersville, Ia.

A bill has been passed authorizing an appropriation of $16,000 for the erection of a bridge over the canal at Canajoharie, N. Y.

The New Columbus bridge company was awarded the contract for a bridge over Pleasant run at Spruce-st., Indianapolis, Ind.

Bids will be received until June 7, at Versailles, Ind., for the construction of a wagon bridge over Otter creek at Ruby's ford.

The board of viewers appointed to inquire into the necessity of a county bridge over Cascade run, near Washington, Pa., has recommended that a new bridge be built.

A new bridge will be erected over Spring brook, near Godeffroy, N. Y., to replace the one recently washed away by the flood.

The board of trade at Massillon, O., is urging the county commissioners to erect bridges across the canal and river at Columbian hights.

The plans for the new bridge that is to span Panther hollow, in Schenley park, Pittsburg, are completed and bids will be asked at once.

The contract for the Como-ave. bridge, St. Paul, Minn., was awarded to the Gillett-Herzog manufacturing company of Minneapolis, Minn.

The contract for constructing a bridge across the Sni at Louisiana, Mo., has been awarded to the Youngstown bridge company for $4,500.

The Indiana bridge company was awarded the contract for building a new river bridge across the Sangamon river near Monticello, Ill.

The Wrought iron bridge company, Canton, O., was awarded the contract for a bridge across the Tittabawassee at Saginaw, Mich., for $9,994.

Plans are being drawn for the construction of a new wagon bridge across the Missouri river at Sioux City, Ia. The bridge will cost $750,000.

The Pennsylvania steel company presented the lowest bid, $37,988, for a viaduct on W. Eighth-st. over Boldface creek road, at Cincinnati, O.

The contract for building a large iron bridge near Geneva, Neb., and all of the wood bridges this season, was awarded to H. T. Ward & Co. of Tecumseh.

The street commissioner and alderman of the Third ward, Bloomington, Ill., have in view the erection of a new steel bridge across the Alton tracks on Mill-st.

The question of a new bridge across Decker's creek, connecting Morgantown and South Morgantown, W. Va., is again under consideration.

The citizens of Cole and Callaway counties, Missouri, will endeavor to raise funds by subscription for building a bridge across the Missouri river.

The highway commissioners of Dundee, Ill., and the officers of the electric road have in contemplation the joint construction of a bridge across the Fox river.

An ordinance has been introduced in the city government of Manchester, N. H., providing for the erection of a new bridge across the Merrimac river at Granite-st.

The plans for an iron lift bridge over Newton creek at Vernon-ave., Brooklyn, N. Y., have been approved. The plans were made by Engineer John J. McLaughlin.

Bids will be received May 7 at Houghton, Mich., for the substructure and superstructure of a steel bridge across Portage lake, between Hancock and Houghton.

The Indiana bridge company, Muncie, Ind., was awarded the contract for building an iron bridge over Bon Pas creek at the old Kitchen's bridge crossing, between Wabash and Edwards counties, Illinois, for $2,100.

A petition is in circulation at Des Moines, Ia., asking the city council for the construction of a new bridge across the river near the Iowa brick company's plant.

The contract for building the up river bridge across the Maumee, from Garrett-st. to Walbridge-ave., Toledo, O., was awarded to the Toledo bridge company for $185,000.

The Edge Moor bridge company presented the lowest bid for the construction of a steel highway bridge over the railroad tracks on Broad-st., Atlanta, Ga. The bid was $22,200.

The contract for building an iron bridge across the Escanaba river, three miles west of Gladstone, Mich., has been awarded to the Gillet-Herzog manufacturing company of Minneapolis for $500,700.

Sealed proposals will be received until May 15 at Glendive, Mont., for erecting a bridge across the Yellowstone river. Each bidder must furnish his own plans and specifications. Check of 5 per cent. required.

The new bridge over Swan creek, at St. Clair-st., Toledo, O., has not been accepted by the city. The structure seems to have sprung and become "set" in that position so that it will be impossible to spring it back again.

Bids will be received at Plymouth, Ind., until May 10, for building a bridge across the Tippecanoe river, at a point one mile north of the village of Ilion. Each bid must be accompanied by a preliminary bond in the sum of $2,500.

Sealed proposals will be received at Indianapolis, Ind., until June 3 for the superstructure of a bridge over White river at its intersection with the Westfield free gravel road, near Broad Ripple. A bond is required of each bidder.

Bids were received April 16 for taking down the old iron bridge across Cherry creek at Broadway, Denver, Col., and reerecting the same upon cylinder foundations, and the contract was awarded to the Bullen bridge company of Pueblo for $6,765.82.

Contracts for canal bridges were awarded at Albany, N. Y., April 11, as follows: Iron canal bridge at High-st., Cohoes, Groton bridge company, $3,722; Manor-ave., Cohoes, Hilton bridge company, $2,833; over Glen Falls feeder of the Champlain canal at Baring-st., Sandy Hill, Riley, Reardon & Dempsey, $2,498.

The Indiana bridge company, Muncie, Ind., was awarded the contract for two new bridges and moving one by the county commissioners at Anderson, Ind. One bridge will be built across Fall creek at Ingalls and one across the White river at Hamilton. The bridge at Broadbent's mill will be moved two miles further up Killbuck.

Bids will be received until May 6 at San Bernardino, Cal., for plans and specifications, straining sheets and working details thereof, and the construction of a steel bridge of three spans, each span sixty feet, across Lytle creek, on Colton-ave., between San Bernardino and Colton. A certified check for 10 per cent. of the amount bid is required.

PARKS.

A park is contemplated for Knox, Me., this year.

The need of a park is being agitated in Huntington, W. Va.

Action is being taken at Dayton, O., for improving the Y. M. C. A. park.

The park board, Rochester, N. Y., has decided to expend $5,500 on Seneca park.

A public park will probably be developed of the grounds around Lake Ellerslie at Lexington, Ky.

The business men of Chicopee, Mass., are very desirous of securing a park for Chicopee Falls.

The town of Greenwich, Conn., has purchased Round island for a public park, at a cost of $75,000.

Work will begin May 1, at Peoria, Ill., on the improvement of Glenoak, Bradley and Madison parks.

A plot of ground has been donated to the town of Logansport, Ind., by the Hon. H. P. Biddle for park purposes.

The metropolitan park commissioners of Malden, Mass., will begin operations early in May on the Malden boulevard.

A petition has been circulated for the improvement of Lincoln park, in the Eighteenth ward, Milwaukee, Wis.

The park commissioners at Hyde Park, Mass., voted recently to purchase land in the vicinity of "High Rock" for park purposes.

A bill has been signed by Governor Morton of New York authorizing the expenditure of $3,000,000 this year for small parks and play grounds for the children.

STREET LIGHTING.

An electric light plant is contemplated for Georgetown, S. C.

An electric light plant has been established at Alexandria, La.

Action is being taken toward securing an electric light plant for Orangeburg, S. C.

Bids will be received until June 1 at Vancouver, B. C., for lighting the city with electricity.

Proposals will be considered by the mayor of Fayetteville, N. C., for the erection of an electric light plant.

STREET RAILWAYS.

George Dowell is interested in a proposed electric line at Pana, Ill.

An electric railway is contemplated between Chester and Newburgh, N. Y.

An electric railway, requiring three power plants, is to be established at Longwood, Fla.

P. H. Tobin, A. F. Platter and others are trying to establish an electric railway at Denison, Tex.

An electric railway line will be built from Rossville, Tenn., to Chickamauga park by D. M. Stewart and others.

H. B. Tuthill and Dr. A. G. Tillotson are interested in the proposed electric line from Michigan City, Ind., to Laporte.

The electric street car line at East Lake, La., will be extended to connect with the Bradley-Ramsay tram road several miles north of the city.

MUNICIPAL BONDS.

Bids will be received until May 6 at Lander, Wyo., for $20,000 of 6 per cent. bonds.

Bids are invited at Logan, O., until May 9 for the purchase of $35,000 of 5 per cent. bonds.

Bids will be received until May 4 at Youngstown, O., for the purchase of $10,000 5 per cent county bonds.

Bids will be received until May 16, at St. Bernard, O., for the purchase of $3,500, $2,500 and $5,000 of 5 per cent. bonds.

Bids will be received until May 6 at Glenwood Springs, Col., for the purchase of $28,000 of 6 per cent. road and bridge bonds.

NOTICE TO WATER-WORKS CONTRACTORS.

Brazil, Indiana Water-Works Extension.

Sealed proposals will be received until six (6) o'clock P. M. of the 18th day of May, 1895, at the office of the city clerk of Brazil, Indiana, for reconstructing the water-works system according to the plans, specifications and drawings now on file at the city clerk's office. The successful bidder will cash a sufficient amount of city bonds at par to pay for the plant.

All bids must be accompanied by a certified check to the amount of one thousand ($1,000) dollars as a guaranty that the bidder will within five (5) days after the acceptance of his bid enter into contracts for constructing the plant and cashing the bonds.

The plans and specifications can be seen at the office of the city clerk, and all information concerning the bonds, and the city's assessed valuation and indebtedness can be obtained of city clerk, Mr. John Macdonald.

The common council reserves the right to reject any or all bids.

By order of the common council.

ALVIN T. HERT, Mayor.
JOHN MACDONALD, City Clerk.

FOR SALE.

Paving Brick Plant of the Monongahela Fire Clay Co., at Monaca, Pa., capacity, 30,000 per day, of either fire clay or shale; brick have stood highest among 26 competitors; make paving, fire and building brick; good market and orders for coming season; owners are in other business. For particulars inquire at works or of Orr B. Bovard, 104 Fourth Avenue, Pittsburgh, Pa.

A Capable Civil Engineer Available.

Arthur Lagron, City Engineer of Freeport, Ill., whose name is familiar to the readers of PAVING AND MUNICIPAL ENGINEERING, desires to improve his present position. Thoroughly versed in all branches of municipal engineering, as grading, paving, macadamizing, surveying, platting, etc.; sewer construction, sanitary engineering, also railroad surveying and construction. Will accept any suitable position or will take charge of temporary works.